U. S. DEPARTMENT OF AGRICULTURE

FARMERS' BULLETIN No. 1305

The SOFT RED WINTER WHEATS

SOFT RED WINTER WHEAT comprises about 30 per cent of the total wheat acreage of the United States, more than 20 million acres being grown in 1919. Most of the wheat grown in the eastern half of the United States belongs to this class. With the exception of the State of Washington this class of wheat is relatively unimportant in the western half of the country. The States leading in the production of soft red winter wheat are Missouri, Indiana, Ohio, Illinois, Texas, Kansas, Pennsylvania, and Oklahoma.

The soft red winter wheats are generally best adapted to humid areas where the winters are not too severe. They are able to withstand the effects of excessive moisture better than most of the other wheats, but are less resistant to drought and severe winter temperatures.

Flour made from this class of wheat contains less gluten and more starch than does flour from the hard red spring and hard red winter wheats, and so is preferred for pastry making and much of the home baking.

At least 66 distinct varieties of soft red winter wheat, known by nearly 400 different names, are grown commercially in the United States, and additional varieties are grown experimentally. These varieties differ widely in yield, adaptation, milling and baking value, and other characteristics. The most widely grown varieties in the United States in order of importance are Fultz, Fulcaster, Mediterranean, Poole, Red May, Red Wave, and Harvest Queen. The area of each of these varieties in 1919 varied from about 4,800,000 acres to about 1,000,000 acres.

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THE SOFT RED WINTER WHEATS.[1]

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THE SOFT RED WINTER CLASS OF WHEATS.

FIVE classes of wheat are now officially recognized in the United States, one of which is known commercially as soft red winter wheat. This class is composed of a large number of varieties having soft to semihard red kernels. They are grown almost exclusively from fall sowing. Most of the wheat grown in the eastern half of the United States belongs to this class. Two varieties of club wheat having red kernels, but which are grown mostly from spring sowing in Washington and Idaho, are classed as soft red winter in the Official Grain Standards of the United States, but are not considered in this bulletin.

WHERE GROWN.

The soft red winter wheats are grown chiefly in the eastern half of the United States (Fig. 1), where the climate is humid. This class of wheat is relatively unimportant in all the western half of the country with the exception of the State of Washington. The States leading in the production of soft red winter wheat, in the order of their importance, are Missouri, Indiana, Ohio, Illinois, Texas, Kansas, Pennsylvania, and Oklahoma. In these States the area of

[1] The information given in this bulletin is based upon (1) varietal experiments conducted by the Office of Cereal Investigations, Bureau of Plant Industry, United States Department of Agriculture, and the State agricultural experiment stations, either independently or in cooperation; (2) classification studies of all American wheat varieties; (3) a survey of the wheat varieties of the United States, in cooperation with the then Bureau of Crop Estimates, based upon 19,000 returns from 70,000 questionnaires sent to crop correspondents; (4) several years of personal observation by the writers of the wheat fields in the States where these varieties are grown; and (5) milling and baking experiments conducted by the Milling Investigations Section, Bureau of Agricultural Economics, in cooperation with the Office of Cereal Investigations, and also by the State agricultural experiment stations.

this class of wheat varies from about 3 million acres in Missouri to about 1 million in Oklahoma. It is practically the only class of wheat grown in the South Atlantic and Gulf States. More than 20 million acres of soft red winter wheat were grown in 1919. This was over 30 per cent of the total wheat acreage in the United States. The distribution of soft red winter wheat in the United States is shown on the map in Figure 1.

AREAS TO WHICH ADAPTED.

The soft red winter wheats are best adapted to humid areas where the winters are not too severe. As a class they will not withstand as severe winter temperatures as the hard red winter wheats. They usually are less resistant to drought than the other classes of wheat. On the other hand, they will withstand the effects of excessive

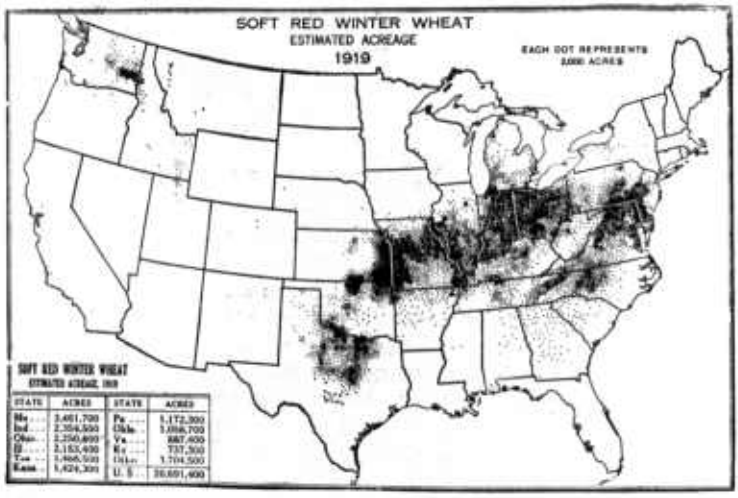

FIG. 1.—Outline map of the United States, showing where soft red winter wheat was grown in 1919. This class of wheat occupies nearly one-third of the total acreage of all wheat and nearly one-half of the total acreage of winter wheat. The States leading in its production are Missouri, Indiana, Ohio, and Illinois.

moisture better than most of the other wheats. Most of them have stiff straw and hence are not especially subject to lodging and so develop normally in wet seasons. None of the soft red winter wheats has shown any marked resistance to stem rust, leaf rust, or bunt (stinking smut), although the varieties differ in respect to their susceptibility to these diseases.

In general, the soft red winter wheats are the best adapted varieties for those sections in the eastern United States having an annual rainfall of more than 30 inches. In Wisconsin, northern Michigan, and the northern New England States the winters are too severe for these winter wheats, so spring wheat is most frequently grown. In New York soft white wheat is usually grown. In Wisconsin and Iowa hard red winter wheat is more important. The soft red winter wheats are the best-adapted varieties in the Southern States, but wheat is not an important crop in these States. Very little wheat is grown on the Atlantic and Gulf Coastal Plains.

In Illinois, Iowa, Missouri, Kansas, Oklahoma, and Texas, there is an area in which both soft red winter and hard red winter wheats are adapted. This area may shift during periods of one or more years, owing to seasonal variations which affect one class of wheat more favorably than the other. In dry seasons in this area the hard red winter wheats usually outyield the soft red winter wheats, but in wet seasons the reverse is true. The soft red winter wheats suffer more from low temperatures. Market prices for the two classes of wheat also affect the relative acreage of each grown within the transition zone. New varieties of either soft red winter or hard red winter wheat also may change the relative adaptation for the two classes. Frequently soft red winter varieties are grown on the bottom lands and heavy soils to avoid the lodging which probably would occur if hard red winter wheats were grown under such conditions, while the latter are grown on the higher, drier, and lighter soils.

In parts of Ohio, Pennsylvania, New York, and Michigan, varieties of white winter wheat outyield most of the soft red winter wheats grown. Owing to the better quality for bread making and higher market price for the red wheat, however, it is grown more abundantly in all of these four States except New York.

Flour made from the soft red winter wheats contains less gluten and more starch than flour from the hard red spring and hard red winter wheats. Flour made from these hard wheats is generally preferred by commercial bakers of light bread because of the gluten quality. Large quantities of soft red winter wheat, both alone and in blends with hard wheats, are used, however, in the manufacture of bread-making flours. Small mills make a good flour for local consumption from the soft red winter wheats. The flour from these soft wheats is excellent for pastry making and home baking, and is much used for these purposes. The varieties of this class of wheat differ widely in milling and baking value. Some are nearly equal to hard wheats, while others are little better than club wheats for bread making. The better varieties, as grown in some sections of Kansas, Oklahoma, or Texas, in certain seasons, produce fairly hard kernels which are nearly equal to the best of the hard red winter varieties in milling and baking quality. On the other hand, the hard red winter wheats when grown in very humid regions become soft and starchy and of no better quality than the soft red winter wheats for the making of bread flours.

VARIETIES.

At least 66 distinct varieties of soft red winter wheat, known by nearly 400 different names, are grown commercially in the United States. Many additional varieties, not yet distributed to farmers, are being grown experimentally. A considerable number of varieties formerly of importance have partially or entirely disappeared from cultivation.

The varieties of soft red winter wheat differ widely in yield, adaptation, earliness, strength of straw, and milling and baking value, as well as in their external structure and appearance. Some varieties, although differing in their adaptation, can scarcely be distinguished from one another by appearance alone. Most of the important varieties of soft red winter wheat are each grown under several

names which are not generally recognized as representing only one variety. Several of the old standard varieties have been exploited under new names from time to time. For convenience in discussion, the recognized varieties of soft red winter wheat are divided into eight sections on the basis of head and chaff characters. The synonymous names are given in the discussions of the recognized varieties.

DISTINGUISHING CHARACTERS AND VARIETIES OF SOFT RED WINTER WHEAT.

SECTION 1.—Heads beardless; chaff glabrous (not velvety), white or yellow.
Eastern grown: Fultz, Trumbull, Ashland, Zimmerman, Walker, Rice, Oakley, Wyandotte, Flint, Purplestraw, Climax, Leap, Prosperity, Forward, Harvest Queen, Fultzo-Mediterranean. *Western grown:* Big Frame, Lofthouse, Buffum No. 17, Minhardi, Red Russian, Sol, Squarehead.

SECTION 2.—Heads beardless; chaff glabrous (not velvety), brown or red.
Eastern grown: Poole, Portage, Russian Red, Red May, Illini Chief, Red Clawson, Rochester, China, Wheedling, Curvell, Red Wave, Homer, Rupert, Resaca, Gold Drop, Rural New Yorker No. 6. *Western grown:* Fleming, Peterson, Odessa (eastern also), Squareheads Master.

SECTION 3.—Heads beardless; chaff pubescent (velvety), white or yellow.
Jones Fife (eastern and western), Mealy, Triplet (western grown).

SECTION 4.—Heads beardless; chaff pubescent (velvety), brown or red.
Grandprize.

SECTION 5.—Heads bearded; chaff glabrous (not velvety), white or yellow.
Fulcaster, Mammoth Red, Nigger, Gipsy, Gladden, Valley, Sibley, Rudy, Silversheaf, Golden Cross, Nebraska 28 (western grown).

SECTION 6.—Heads bearded; chaff glabrous (not velvety), brown or red.
Mediterranean, Red Rock, Diehl-Mediterranean, Goens, Cox (western grown).

SECTION 7.—Heads bearded; chaff pubescent (velvety), white or yellow.
Pride of Genesee.

SECTION 8.—Heads bearded; chaff pubescent (velvety), brown or red.
Penquite.

Section 1.—HEADS BEARDLESS; CHAFF GLABROUS (NOT VELVETY), WHITE OR YELLOW.

This section consists of 23 commercial varieties varying greatly in many plant, head, and kernel characters. Sixteen of these varieties are grown almost exclusively in the eastern half of the United States and seven of them in the western half.

FULTZ.

Fultz is grown also under the names Ber Ban, Bluestem, Bluestem Fultz, Economy, Everitt's High Grade, Grains o' Gold, Halver, Hickman, High Grade, Improved English, Improved Fultz, Jersey Fultz, Little Red Jersey, McKennon, New Economy, Nixon, Perpetuated Fultz, Roosevelt, Rust Proof, Shamrock, Slickhead, Tennessee Fultz, Tipton Red, and Winter Pearl.

This variety has slightly inclined, rather tapering heads of medium length and compactness. The kernels are rather small, of a pale red color, and soft (Fig. 2, A). The plants are of medium height and midseason in maturity and have a purple or reddish straw when ripe.

Fultz originated from three heads found in a field of Lancaster (Mediterranean) wheat in Mifflin County, Pa., in 1862, by Abraham Fultz. This wheat was increased for several years and later widely distributed over the United States. In 1871 the United States Department of Agriculture distributed 200 bushels of this variety.

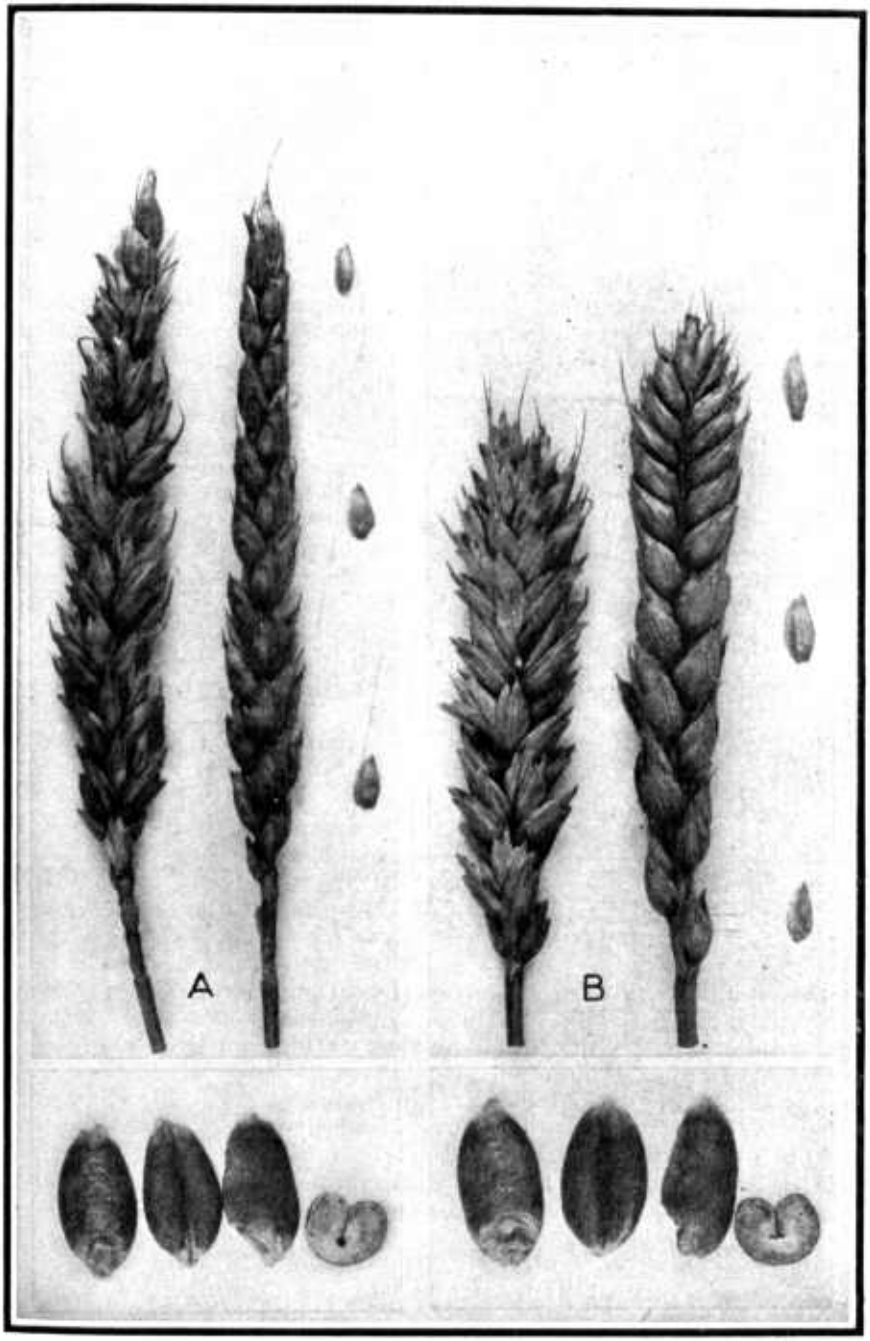

FIG. 2.—Heads, chaff, and kernels of Fultz (*A*) and Fultzo-Mediterranean (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

Fultz is now the third most important variety of wheat and the leading variety of soft red winter wheat in this country, about 4,800,000 acres being grown in 1919. This represented nearly one-fourth of the total acreage of soft red winter wheat. The States leading in the production of Fultz wheat are Missouri, Illinois, Indiana, Kansas, Ohio, Kentucky, Pennsylvania, Oklahoma, Maryland, and Virginia, each of which grows more than 100,000 acres annually. In 1919 about 1,600,000 acres of Fultz wheat were grown in Missouri. The distribution of Fultz wheat in the United States in 1919 is shown on the accompanying map (Fig. 3).

Fultz is adapted to a large area. It is one of the leading varieties in practically all States south of the Ohio River and in portions of several States north of the Ohio. In Kentucky and New Jersey it has outyielded practically all other varieties. In many States Fultz yields less than Fulcaster and some other bearded varieties, but nevertheless it is grown largely because it is beardless. Although a productive variety for general growing, it frequently is outyielded by other varieties in local districts. It probably could profitably be replaced by other varieties in many localities.

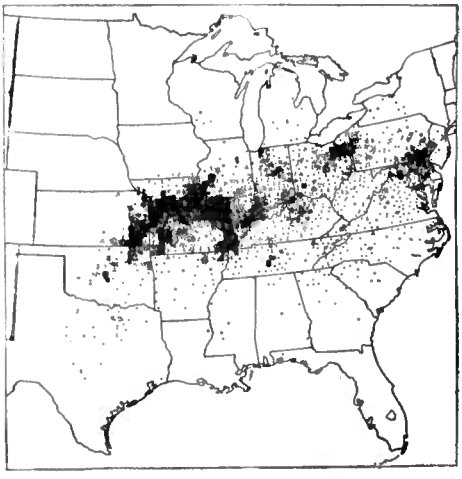

FIG. 3.—Outline map of a portion of the United States, showing where Fultz wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 4,801,100 acres.

The kernel of Fultz is rather soft, but its milling and baking qualities are good. Only a few of the soft red winter wheats surpass it in these qualities.

TRUMBULL.

Trumbull is taller than Fultz and has a stronger straw. Its straw is not as purple as that of Fultz and the heads are more erect. This wheat is a pure-line selection from Fultz made at the Ohio Agricultural Experiment Station some time before 1908, in which year it was first included in varietal experiments. It was increased and distributed later by that station, and is now grown in several sections of Ohio.

Trumbull has outyielded Fultz by from 2 to 4 bushels per acre in Ohio. It is one of the best varieties of wheat for that State, but little is known concerning its behavior in other States. Trumbull stands high among the soft red winter wheats in milling and baking quality, apparently being superior to Fultz in that respect.

ASHLAND.

Ashland is very similar to Fultz, but has a stronger straw and is claimed to be fairly resistant to scab. Ashland was selected from Fultz at the Kentucky Agricultural Experiment Station. It was distributed first in 1919 and is grown now to a limited extent in Kentucky. This variety has outyielded all others in comparative experi-

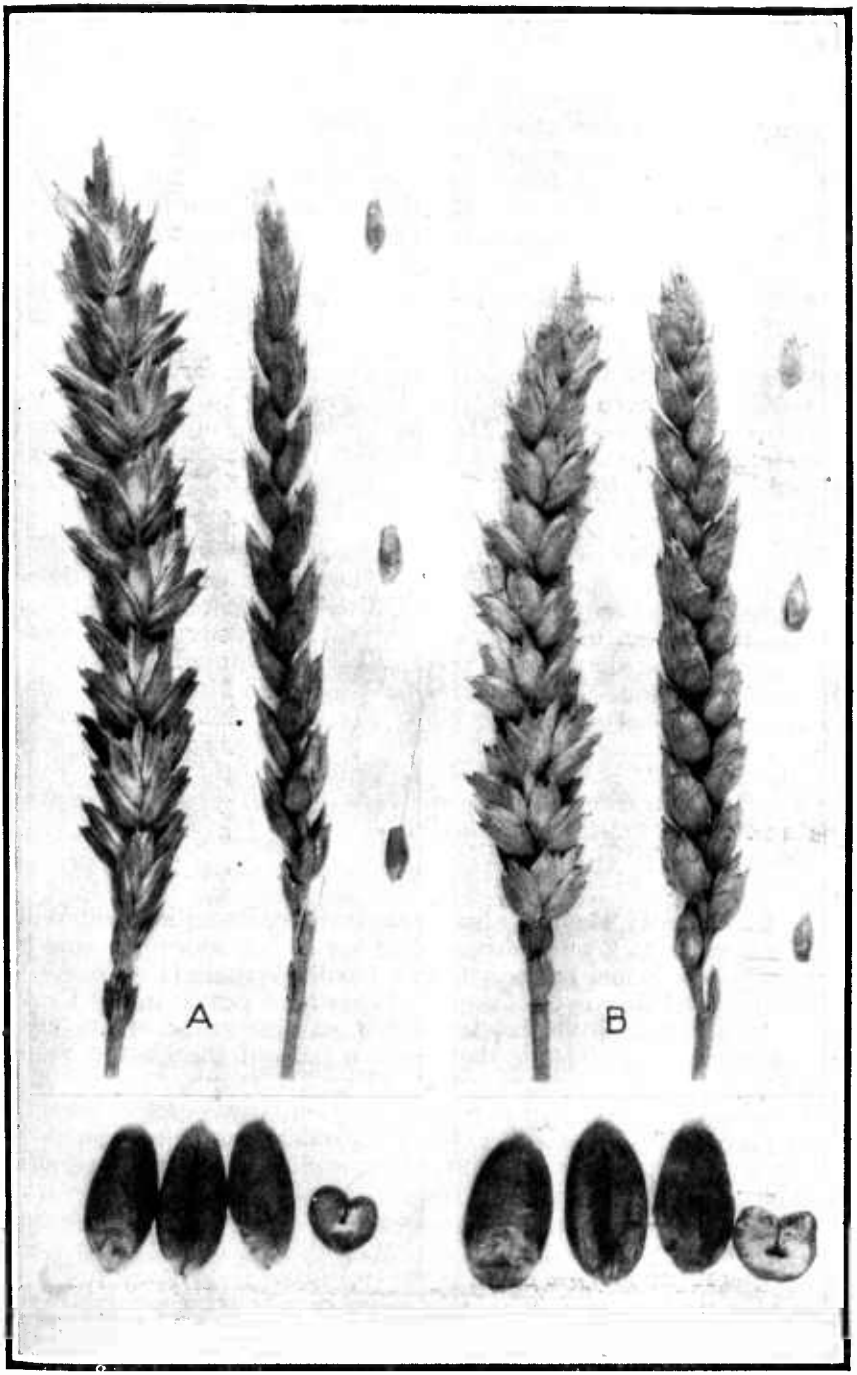

FIG. 4.—Heads, chaff, and kernels of Leap (*A*) and Walker (*B*) wheats. Heads and chaff natural size; kernels in three positions and in cross section, enlarged 2 diameters.

ments at the Kentucky Agricultural Experiment Station and is the most promising wheat for that State.

ZIMMERMAN.

Zimmerman is earlier than Fultz and has white instead of purple straw. The heads are very similar to those of Fultz but are slightly shorter. The kernels of Zimmerman are pale red, small, and rounded.

Zimmerman originated from three heads found in a field of wheat near Frederick, Md., by Henry Zimmerman, in 1837. It was increased by Mr. Zimmerman and first distributed about 1844. It formerly was grown widely in Maryland, Virginia, and Pennsylvania, but now is known to be grown only to a limited extent in Missouri and eastern Kansas.

Owing to its earliness Zimmerman yields well in certain seasons in Missouri and eastern Kansas. On the average, however, it is outyielded by Fulcaster, Fultz, Harvest Queen, and other varieties in these sections. Zimmerman wheat is about the same as Fultz in milling and baking quality.

WALKER.

Walker is similar to Zimmerman, but the heads and kernels (Fig. 4, B) also closely resemble Fultz. The origin of Walker is not known, but it has been grown in the United States for 50 or 60 years. It formerly was an important variety in the eastern United States, but at present less than 25,000 acres are grown annually. Walker is grown in seven States in the central and southern Mississippi Valley, as shown on the accompanying map (Fig. 5). This variety has not shown high comparative yields in the limited tests in which it has been included and probably could be replaced with profit by Fultz, Fulcaster, Mediterranean, or other varieties. It probably is about equal to Fultz in milling and baking value.

RICE.

The Rice variety (known also as Early Rice, Red Rice, and White Rice) is similar to Zimmerman. However, it has more tapering yet compact heads, longer tip beards, and harder kernels (Fig. 6, A).

The origin of Rice is not known. It has been grown in the United States for at least 40 years. In 1919 it was grown on about 30,000 acres in seven States in the southeastern part of the United States, as shown on the accompanying map (Fig. 7).

Rice wheat has been grown in very few comparative experiments in recent years. It has not appeared very promising, although it yields well in some seasons on account of its earliness. Apparently Rice could be replaced largely by such varieties as Fulcaster, Purplestraw, and Fultz in the sections where it is grown. Nothing is known concerning its milling and baking quality, but from the appearance of the kernels it probably is about equal to Fultz.

OAKLEY.

Oakley (Extra Early Oakley) is known also as Early Oakley, Norwood, and Neverfail. It differs from Fultz chiefly in being earlier and in having a more tapering, erect head. Like Fultz it has a purple straw.

The origin of Oakley is not known. It was grown in Kentucky about 30 years ago, but now is known to be grown commercially only on a small acreage in two counties of North Carolina.

Oakley was formerly a promising variety in Kentucky from the standpoints of both yield and quality. During later years better varieties have largely displaced it, and doubtless it could be entirely displaced with profit.

WYANDOTTE.

Wyandotte (Wyandotte Red) differs from Oakley chiefly in having nodding heads and in being taller. It was first obtained by the Ohio Agricultural Experiment Station in 1886 from T. Balliet, Nevada, Ohio. The original source of the wheat is not known. It formerly was grown in Ohio and Indiana, and a small acreage still is grown in Ohio.

Comparative experiments have shown that several other varieties are more productive than Wyandotte and it should be displaced by them. Little is known concerning the quality of Wyandotte.

FIG. 5.—Outline map of the southeastern United States, showing where Walker wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 24,300 acres.

FLINT.

Flint (Red Flint) is known also as Early May, Little May, Little Red, Little Red May, May, Rappahannock, Red Davie, and Red May. It is somewhat similar to Fultz in kernel appearance, and in having purple straw, but is quite distinct from that variety. The heads of Flint are erect, oblong, rather compact, and have long tip beards (Fig. 8, A). It is earlier and slightly shorter than Fultz. Flint also is very similar to Zimmerman except in having purple straw.

Flint has been grown in the United States under various names for at least seventy or eighty years. Its origin is not known. There is much confusion in the names applied to this variety, several of them being used also for a brown-chaffed wheat discussed later as Red May. Flint wheat was grown on about 97,000 acres in 1919 in several eastern States, as shown on the accompanying map (Fig. 9). The States leading in the production of Flint are Virginia, North Carolina, South Carolina, and Illinois. Flint, owing to its earliness, is adapted to certain seasons and localities. In general, however, it produces lower yields than other varieties in the sections in which it is grown. It has given fair yields on the Mississippi bottom lands in Illinois and Missouri. In several counties in the south-central part of Virginia and in the adjoining portion of North Carolina, Flint is the leading variety of wheat. Apparently it yields as well, or better, than other varieties in this district. Nothing is known concerning the milling and baking value of Flint wheat, but the kernels are similar to those of Fultz.

PURPLESTRAW.

Purplestraw is known also as Alabama Bluestem, Bluestem, Early Purplestraw, Georgia Bluestem, Georgia Red, Mountain Purple-

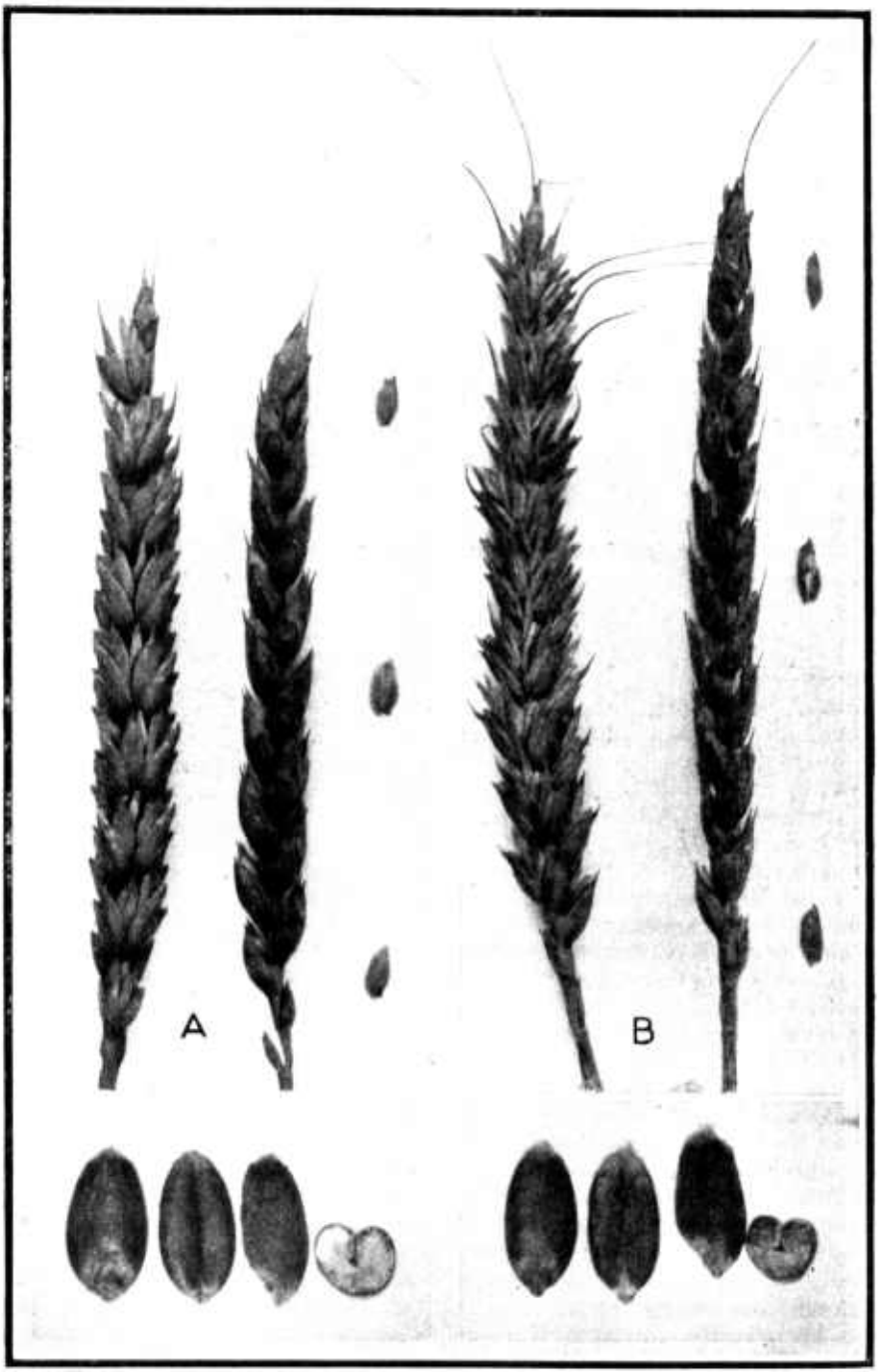

FIG. 6.—Heads, chaff, and kernels of Rice (*A*) and Buffum No. 17 (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

straw, and Ripley. This variety closely resembles Flint, but has shorter tip beards (Fig. 8, B). It is very early and is distinct from all other soft red winter wheats in that it will produce a crop from spring sowing. Although a spring wheat in this respect the plants have the appearance of winter wheat, and it is grown only as a winter variety. In the section where it is grown the winters are sufficiently mild to permit a hardy spring wheat to survive.

The source and date of the introduction of the Purplestraw variety are not known, but it has been grown in this country for at least 100 years. It is the leading variety of wheat in Georgia, Alabama, and South Carolina. About 273,000 acres of Purplestraw were grown in the United States in 1919, the distribution of which is shown on the accompanying map (Fig. 10).

Purplestraw usually has given higher average yields than any other wheat in South Carolina, Georgia, Alabama, and Mississippi. It also has given high comparative yields in Arkansas, North Carolina, and northeastern Virginia. The yields of Purplestraw usually have been higher than those of Fultz and Red May in these sections, and as high or higher than those of Fulcaster. As the latter is a bearded variety, it is less popular than Purplestraw in the southern areas. Purplestraw is of good milling and baking quality, being equal to any of the varieties thus far discussed.

FIG. 7.—Outline map of a portion of the east-central United States, showing where Rice wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 30,900 acres.

CLIMAX.

Climax (Jones Climax) is known also as Grecian, Pennsylvania, Wilson, and Wilson Special. A variety known as Celebrated K. B. No. 2 is practically identical with Climax, but the heads of Climax are somewhat more nodding. These two wheats are here considered as being the same. Climax is later and taller than most of the varieties thus far discussed, and the kernels are longer. The heads of Climax are long, tapering, loose, and nodding. (Fig. 11, B.) The straw is white and the kernels soft.

The Celebrated K. B. No. 2 was found in a field of Longberry Clawson wheat belonging to the Knight & Bostwick Seed Co., Rochester, N. Y., in 1898. It was distributed in 1902 but is not known to be grown now under that name. This wheat has been distributed more recently as Jones Climax, and under this name it is grown in several Eastern and Southern States. It is not an important variety, however, as only about 16,000 acres were grown in the United States in 1919.

This variety has not given high comparative yields in any trials and could be displaced profitably by other varieties. The milling and baking value of Climax has not been determined.

LEAP.

Leap (Leap's Prolific) is known also as Hastings Prolific, Woods Prolific, and Woolf. It has rather wide but tapering, open, nodding heads. Brownish stripes on the chaff give it a yellowish appearance (Fig. 4, A). The plants are early and of medium height. The straw is white and the red kernels are midsized and soft.

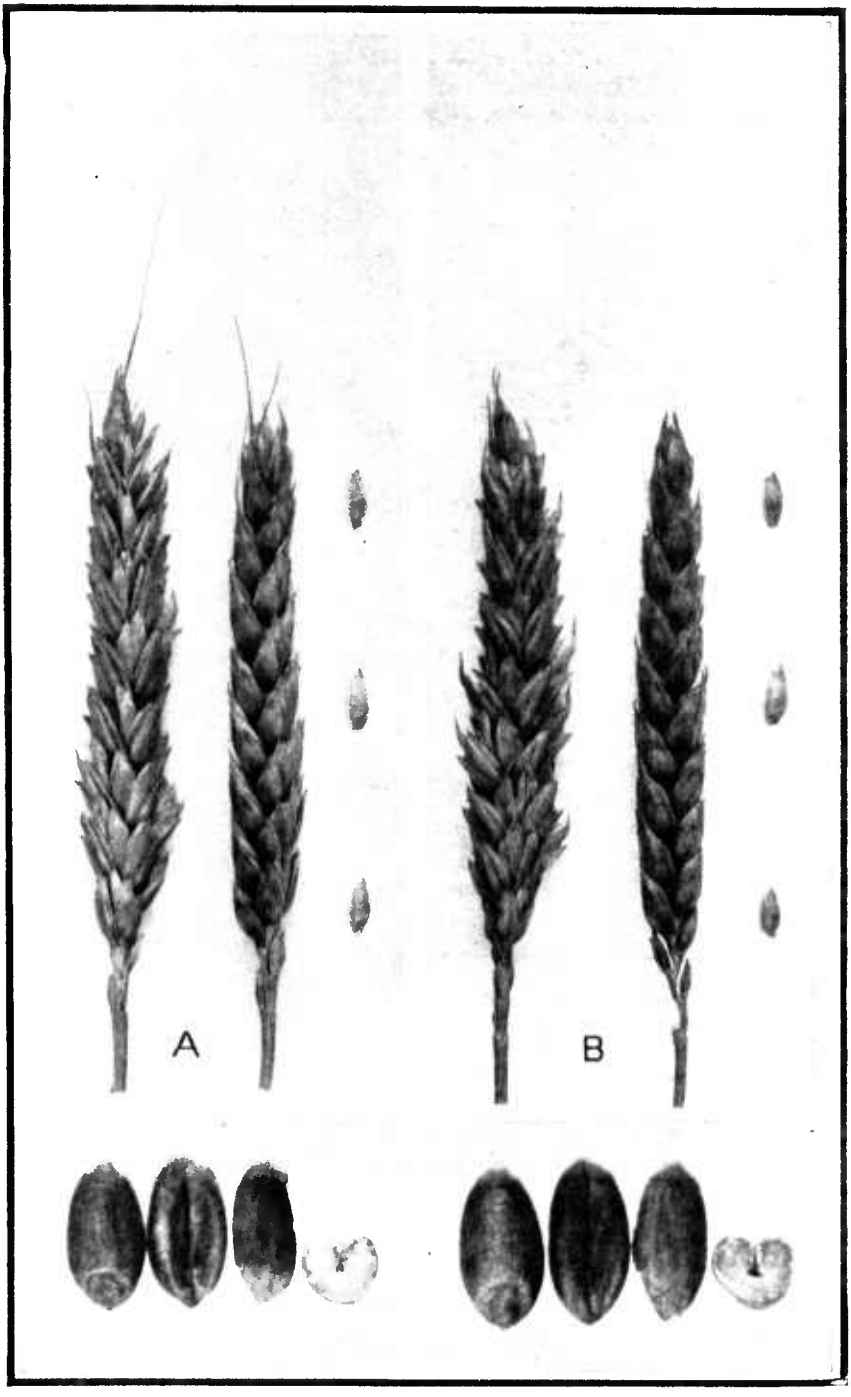

FIG. 8.—Heads, chaff, and kernels of Flint (*A*) and Purplestraw (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

Leap originated from a plant found in 1901 in a field of Mediterranean growing on the farm of J. S. Leap in Virginia. It was distributed about 1905 by T. W. Wood & Sons, seedsmen, of Richmond, Va. The variety rapidly became important, principally in Virginia and North Carolina, but it is grown also in 16 other Eastern and Southern States. More than 500,000 acres were grown in 1919, distributed as shown on the accompanying map (Fig. 12).

FIG. 9.—Outline map of a portion of the east-central United States, showing where Flint wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 97,200 acres.

Leap has given good yields in Virginia and North Carolina. It is one of the good varieties in these States, but has not outyielded all other varieties. In comparative experiments Purplestraw and Fulcaster, the latter a bearded variety, have yielded as well as or better than Leap. Lack of beards may explain some of its popularity in some sections. Leap should be grown only in localities where it outyields Purplestraw, Fultz, and Red May. In States other than Virginia and North Carolina, Leap generally is outyielded by one or more varieties. Its milling and baking quality is good, being about equal to the varieties previously discussed.

PROSPERITY.

Prosperity (American Bronze) is known also as Dutch, Hundred Mark, International No. 8, Invincible, Michigan Red, No Name, No. 8, Red Victory, Silver Chaff, Twentieth Century, and Zinn's Golden. This wheat differs from Leap in having longer and wider, more nodding and less tapering heads (Fig. 13, B). Like Leap, it has yellowish chaff. Just before maturity the stems of Prosperity wheat are covered with a white waxy coating, easily rubbed off. The kernels are midsized and angular.

FIG. 10.—Outline map of the southeastern United States, showing where Purplestraw wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 273,800 acres.

This variety was originated by A. N. Jones, of Newark, N. Y., and is said to be the result of a cross between Martin Amber (a white wheat) and Fultz. Mr. Jones called it No. 8, but later named it American Bronze. It was first distributed by Peter Henderson & Co., seedsmen, of New York City. The variety is grown in Indiana, Michigan, Missouri, New York, Ohio, Pennsylvania, and West Virginia, although not important in any of these States. About 46,000 acres of Prosperity wheat were grown in the United States in 1919. Its distribution then is shown on the map (Fig. 14).

FIG. 11.—Heads, chaff, and kernels of Red Russian (*A*) and Climax (*B*) wheats. Heads and chaff natural size; kernels in three positions and in cross section magnified 3 diameters.

Prosperity has shown high comparative yields only in New York, where it is one of the highest yielding soft red winter varieties. In that State, however, the common white wheats are more productive. Prosperity is of rather poor milling and baking quality, being considerably inferior to Fultz.

FORWARD.

Forward is very similar to Prosperity. It originated from a beardless plant found growing in a field of Fulcaster. The selection was made and the strain has been developed in connection with the experiments in cereal breeding conducted by the Cornell University Agricultural Experiment Station in cooperation with the United States Bureau of Plant Industry. After it had produced good yields at that station it was distributed first in the fall of 1920. Forward is grown on a limited acreage in New York. It appears to be the highest yielding variety of soft red winter wheat in New York and should be grown in preference to other varieties of that class. Nothing is known concerning its milling and baking quality.

FIG. 12.—Outline map of a portion of the eastern United States, showing where Leap wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 513,100 acres.

HARVEST QUEEN.

Harvest Queen is known also as Black Sea, Canadian, Canadian Fife, Imported Scotch, Italian Wonder, Kansas Queen, May Queen, New 100, Oregon Red, Prairie Queen, Red Cross, Salzer's Prizetaker, Virginia Reel, and Winter Queen. This wheat differs from those previously discussed in having compact, nearly erect, square or slightly club-shaped heads (Fig. 13, A). The plants are tall and midseason in maturity. The straw is white and strong. The kernels are dull red, soft, and mid-sized.

Harvest Queen is an old variety, usually known as Black Sea, Oregon Red, and Red Cross. A plant of this wheat was found in a field of another variety by E. S. Marshall, of De Soto, Kans., in 1895. It was increased and named Harvest Queen in 1897. The variety was distributed by Mr. Marshall in the vicinity of its origin and also by seed firms in other localities. A Harvest Queen wheat having white grains was formerly grown in this country, but apparently has passed out of cultivation.

Harvest Queen (including synonymous varieties) is now an important variety in eastern Kansas, northwestern Missouri, and northern Oklahoma. A considerable acreage is grown also in Illinois. It is seventh in importance among the soft red winter wheats. About 1,000,000 acres of Harvest Queen wheat were grown in the United States in 1919, distributed as shown on the accompanying map (Fig. 15).

Harvest Queen is one of the highest yielding varieties in northeastern Kansas and the adjoining section of Missouri, where it usually

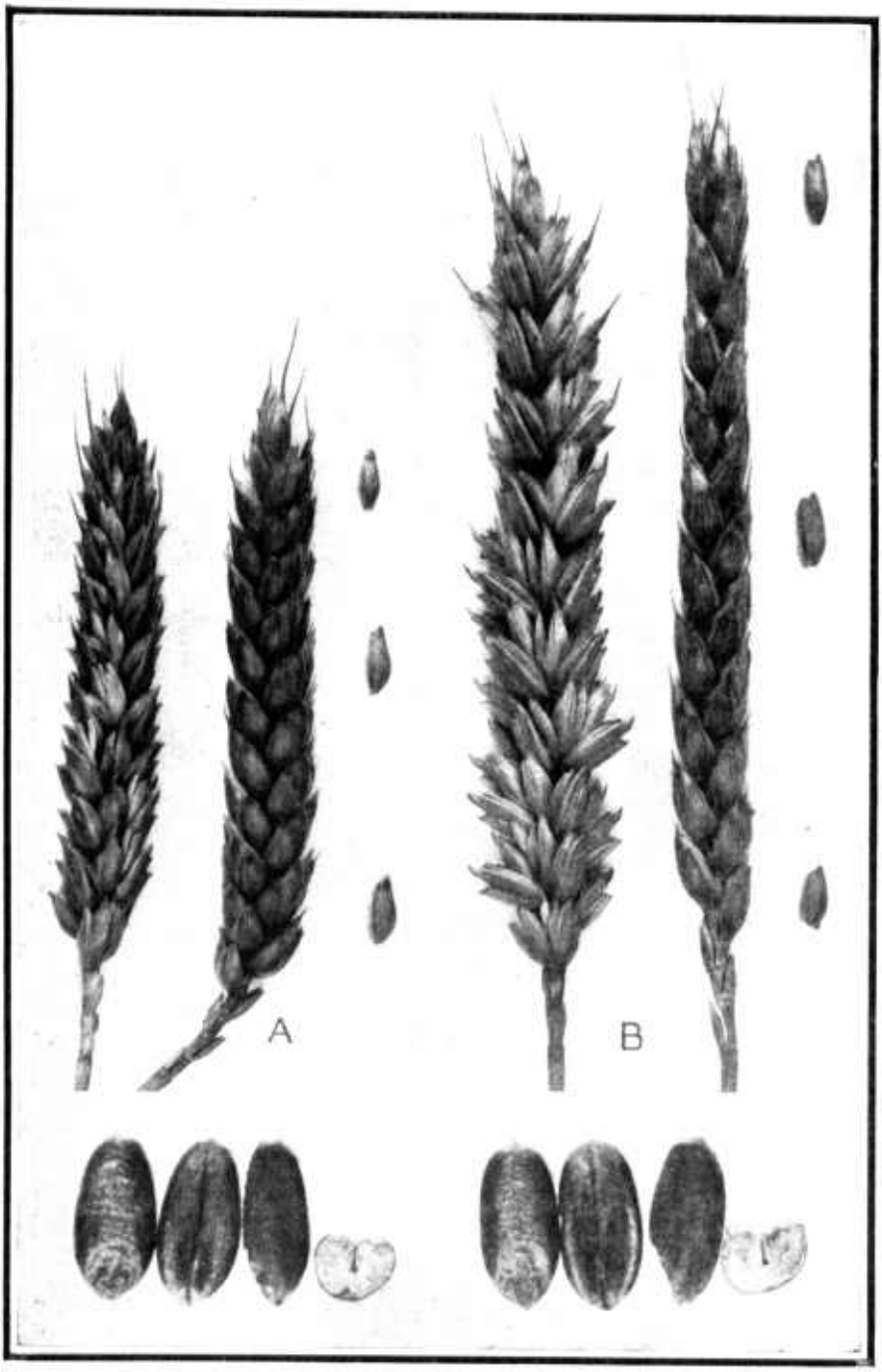

FIG. 13.—Heads, chaff, and kernels of Harvest Queen (*A*) and Prosperity (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

outyields Fulcaster, Fultz, Currell, and the hard red winter wheat varieties. It usually is outyielded by Fulcaster and Mediterranean in southern Kansas and northern Oklahoma, and by Fulcaster and other varieties in eastern Missouri and in Illinois. In Illinois and Indiana there has recently appeared the rosette disease of wheat (one of the foot-rot or take-all group), to which the Harvest Queen variety is very susceptible. A strain has been selected from the variety, however, which is not susceptible. Until this strain is available for distribution, Harvest Queen should not be grown in or near the areas where the disease occurs.

In milling and baking quality Harvest Queen is good, being nearly equal to the varieties previously discussed.

FIG. 14.—Outline map of a portion of the northeastern United States, showing where Prosperity wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 46,000 acres.

FULTZO-MEDITERRANEAN.

Fultzo-Mediterranean is known also as Club, Club Head, Columbia, Double Head, Duck Bill, Early Ontario, Economy, Farmers Pride, Flat Top, Four-Row Fultz, Harper, New Columbia, Scott's Squarehead, Squarehead, Square Top, and Stub Head. Fultzo-Mediterranean differs from all other varieties in this section in having erect, short, compact, decidedly clubbed heads. The heads (Fig. 2, B) resemble those of club wheat to some extent. The plants are midtall and midseason in maturity. The straw is purple and strong. The kernels are very similar to those of Fultz.

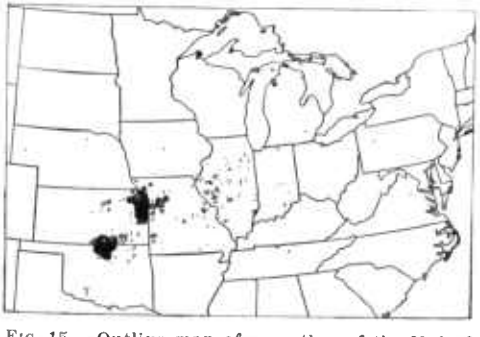

FIG. 15.—Outline map of a portion of the United States, showing where Harvest Queen wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 1,007,600 acres.

Under some of the names listed above the Fultzo-Mediterranean variety has been grown for many years, but its exact origin is not known. It has been grown as Columbia and New Columbia since 1893. The variety was first named and distributed as Fultzo-Mediterranean in 1898 by a seed company which claimed that the wheat was a cross between Fultz and Mediterranean. From the character of the wheat this origin is very improbable.

Fultzo-Mediterranean is grown now in at least 17 States in the eastern half of the United States but is not a leading variety in any of them. It is most important in Missouri, Illinois, and Indiana. About 287,000 acres of Fultzo-Mediterranean were grown in the United States in 1919. The distribution is shown in Figure 16.

Because of its strong stiff straw Fultzo-Mediterranean wheat is often grown on rich, wet, heavy, or bottom lands where other varieties are likely to lodge. It has given good yields in Kentucky, and to a less extent in other States under the above conditions. In general, this wheat has given lower yields than others grown in the same districts. It is somewhat inferior to Fultz in milling and baking quality.

BIG FRAME.

Big Frame has short, tapering, inclined heads. The plants are of midheight and are midseason in maturity. The straw is white. The kernels are midsized, soft, and rounded. The variety differs from Zimmerman in being later and in having more tapering heads.

Big Frame was grown in the Middle Western States many years ago, but the origin of the variety is not known. It was an important variety in Nebraska in the early nineties, but is grown there only in small areas at the present time. It formerly was one of the high-yielding wheats in that State, but it has been displaced almost entirely by hard winter varieties, which are more productive and of higher quality.

FIG. 16.—Outline map of a portion of the eastern United States, showing where Fultzo-Mediterranean wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 287,900 acres.

LOFTHOUSE.

Lofthouse (Winter La Salle and Winter Nellis) differs from Big Frame in having longer heads and longer and more tapering kernels. There is some confusion in the identity of this wheat, as Lofthouse sometimes is reported as having white kernels. The origin of Lofthouse is not definitely known. The variety was distributed in the vicinity of Paradise, Utah, about 1894, by a Mr. Lofthouse. The wheat was reported to have been obtained from the United States Department of Agriculture. Lofthouse is grown now mostly on dry lands in a few counties in Utah and southern Idaho. About 6,500 acres were reported in 1919.

This variety has not given high comparative yields in any experiments and should be replaced, therefore, by other varieties, such as Turkey, a hard red winter wheat. From the appearance of the kernels Lofthouse probably is equal of any of the varieties thus far discussed in milling and baking quality.

BUFFUM NO. 17.

Buffum No. 17 has longer heads than Lofthouse, is at least a week later, and is more winter hardy (Fig. 6, B). The kernels are somewhat harder than those of Lofthouse and most of the wheats so far discussed. Buffum No. 17 is one of the hardiest winter wheats known for the Great Plains area.

This variety originated from a plant found in a field of Turkey wheat by B. C. Buffum, of Worland, Wyo. After being increased it was distributed in 1912. It is grown now to a limited extent in Wyoming.

Buffum No. 17 wheat has given yields nearly equal to those of the best hard red winter varieties in Wyoming and northeastern Colorado. Because of its hardiness it is more successful than other varieties in some seasons. It is not sufficiently hardy, however, to withstand the most severe winters and therefore is less certain than spring wheat. It matures too late to be productive in some seasons. Buffum No. 17 wheat can be recommended only for limited areas in Wyoming, and even there its status is doubtful because of the competition of wheats of other classes. In milling and baking quality it is good, probably being equal to or slightly better than the varieties previously discussed.

MINHARDI.

Minhardi (Minnesota No. 1505) is similar to Big Frame except in having erect heads and in being extremely hardy. It is, perhaps, the hardiest winter wheat known. The straw is white and slender, but rather strong. This variety is the result of a cross between Odessa (a soft red winter wheat) and Turkey (a hard red winter wheat) made at the Minnesota Agricultural Experiment Station in 1902. After having been selected and tested for several years it was named and distributed to farmers in Minnesota about 1919. The Minhardi variety has not given high yields except in limited areas in Minnesota. Another variety of the same origin as Minhardi and named Minturki (Minnesota No. 1507) is nearly as hardy and is more productive and of better quality than Minhardi. Minturki, a bearded wheat of the hard red winter class, generally should be grown in preference to Minhardi. Minhardi is of higher milling and baking quality than most of the soft red winter wheats previously discussed.

RED RUSSIAN.

Red Russian (known also as Australian Club, Early Sunrise, Squarehead, German Red, Montana Deal, and Red Walla) matures extremely late. It has nearly erect, compact, clubbed heads (Fig. 11, A). The straw is white, thick, and strong and the leaves wide and dark green. The kernels are midlong but wide and quite soft. This wheat should not be confused with other varieties grown in the Central and Eastern States which also sometimes are called Red Russian.

The history of this variety is not known, but probably it is of European origin, as it greatly resembles the so-called "Squarehead" wheats of northern Europe in appearance and time of maturity.

Red Russian has been grown in Washington for at least 30 or 40 years. About 1890 it was introduced into the Palouse section of Washington and Idaho, where it is now of more importance than elsewhere. About 155,000 acres of Red Russian were grown in 1919

in four Northwestern States, as shown on the accompanying map (Fig. 17).

Because of its late maturity Red Russian is outyielded by several other varieties in Idaho and eastern Washington, but in the cool, humid sections of western Washington it is the most productive wheat. Outside of this section of Washington, where it sometimes gives very high yields, it should be displaced by better varieties of club, common white, or hard red winter wheats.

Red Russian is probably the poorest of the soft red winter wheats in milling and baking quality. In the Federal Grain Standards it is placed in the Western Red subclass because of its low market value.

SOL.

Sol (Sun) is nearly identical with Red Russian, but the heads are slightly less clubbed and the leaves are longer, wider, and darker colored. This variety originated at the Svalof Plant Breeding Station in Sweden, apparently having been selected from a natural cross between two varieties. It was distributed in Sweden in 1911. In recent years the Sol variety had been distributed in the United States by Charles H. Lilly & Co., seedsmen, of Seattle, Wash., and is grown sparingly in the Puget Sound district of Washington and in California. Sol is very similar to Russian in yield and adaptation and should be grown only where that variety is adapted. As the kernels of the two varieties are practically identical, they are probably alike in milling and baking quality.

FIG. 17.—Outline map of the Pacific Northwest, showing where Red Russian wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 154,900 acres.

SQUAREHEAD.

Squarehead (English Squarehead, Big English, and Clanfield) is practically identical with Red Russian except in being slightly taller and in having slightly longer and less clubbed heads. This is an old English variety which was brought to this country by Richard Clanfield, of Ballston, Oreg., in 1908. It is grown to a slight extent in the Willamette Valley of Oregon. Squarehead is fairly productive under the cool humid conditions of Willamette Valley, but probably will not yield as well as several varieties of common white wheat. The milling and baking quality of Squarehead apparently does not differ from that of Red Russian.

Section 2.—HEADS BEARDLESS; CHAFF GLABROUS (NOT VELVETY), BROWN OR RED.

This section is composed of 21 recognized varieties, several of which are made up of a number of so-called varieties which can not be distinguished one from another. Some of the most important soft red winter wheats are included in this section.

POOLE.

Poole is known also as Bluestem, California Red, Gill, Harvest King, Hedge Prolific, Hundred Mark, Hydro Prolific, Mortgage

Lifter, Kentucky Bluestem, Nissley or Nissley's Hybrid, Ocean Wave, Oregon Red Chaff, Red or California, Red Amber, Red Chaff, Red Fultz, Red King, Red Russell, Royal Red Clawson, Sweet Water Valley, Wagner, and Winter King. It also occurs as a mixture in a wheat called Beechwood or Beechwood Hybrid.

Poole has beardless heads with brown chaff and soft red kernels. The heads are long, wide, flattened, and very nodding (Fig. 18, B). The variety is midseason in maturity. The straw is purple and of medium strength and height. The kernels are midlong and somewhat cylindrical in shape.

The origin of Poole has not been determined, but it has been an important variety in Ohio and Indiana for nearly 40 years. The various names listed above have been applied to it from time to time by growers and seedsmen under the pretense or supposition of having a new variety. A considerable proportion of Poole is grown as Harvest King.

Poole is now fourth in importance among the soft red winter wheats. About 2,450,000 acres were grown in the United States in 1919, nearly half of which was in Ohio. The other States producing large acreages of Poole are Indiana, Missouri, Illinois, and Kentucky. Its distribution in the United States is shown on the accompanying map (Fig. 19), which indicates that it is grown in at least 21 States.

Poole is adapted in general to a large area in the Eastern States, but principally in the eastern half of the Corn Belt. In Ohio it outyields all soft red winter wheats except three new varieties—Gladden, Trumbull, and Portage—the last of which was selected from Poole. Although usually outyielded by some bearded varieties it is apparently the best beardless variety in portions of Indiana, Illinois, Missouri, and Kentucky. Poole is among the high-yielding varieties of the beardless soft red winter wheats in most of the Eastern States.

In milling and baking quality Poole is superior to many of the soft red winter wheats and is fully equal to any of the varieties thus far discussed.

PORTAGE.

Portage can scarcely be distinguished from Poole. It was selected from Poole at the Ohio Agricultural Experiment Station. It was distributed in Ohio several years ago and is grown now in that State as well as in New York and Pennsylvania. Portage has given higher yields than Poole in all parts of Ohio and therefore should be grown in preference to the latter variety. In some parts of Ohio Portage has not given as high yields as the Gladden and Trumbull varieties but has surpassed them in other parts.

In milling and baking quality Portage appears to be somewhat superior to Poole.

RUSSIAN RED.

Russian Red (or Red Russian) can scarcely be distinguished from Poole, differing only in a few minor head characters. This variety is reported to have been introduced from Russia by the American Seed Co., of Rochester, N. Y., apparently during the eighties. It later was distributed also by several other seed companies. The

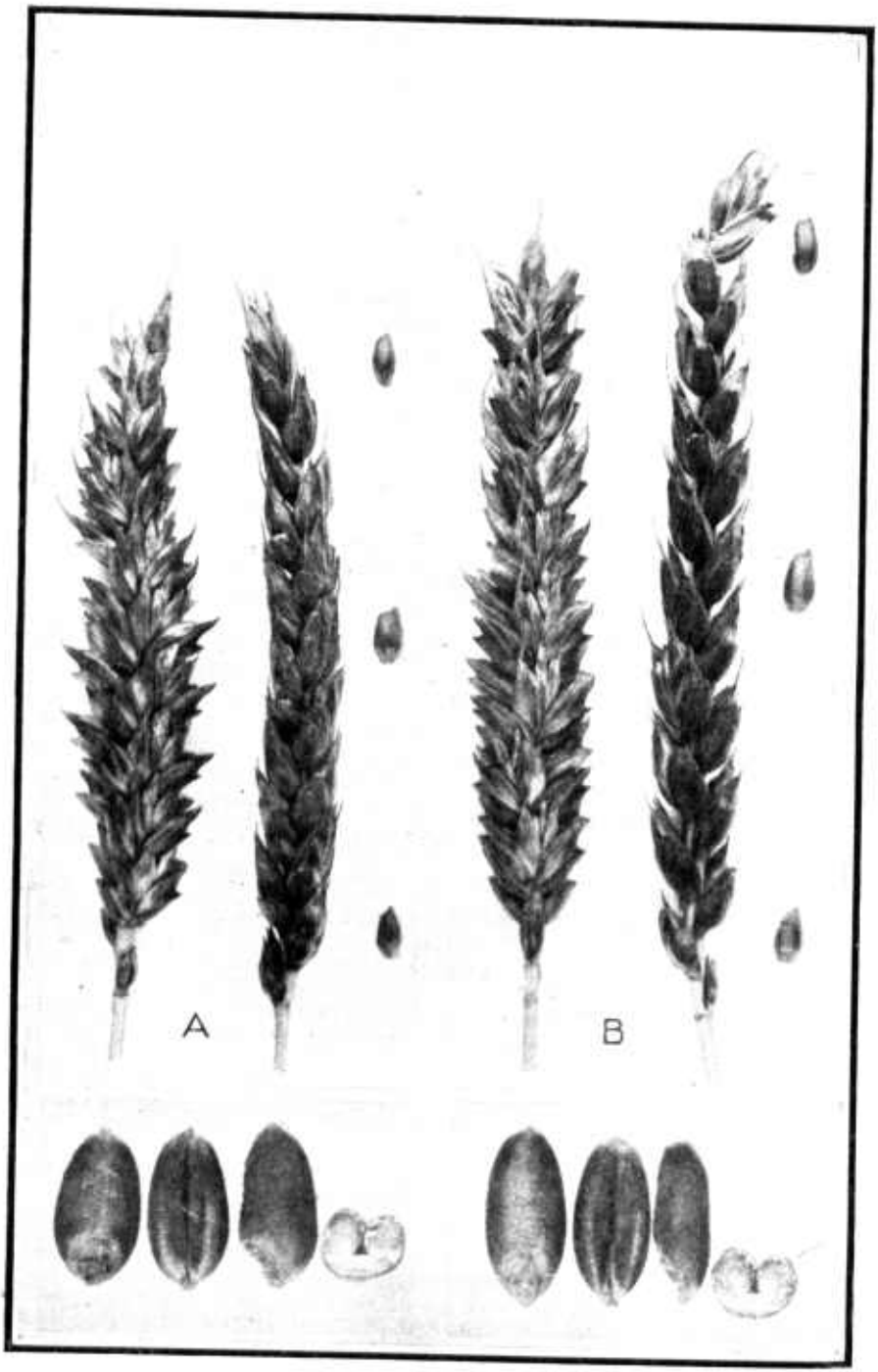

FIG. 18.—Heads, chaff, and kernels of Currell (*A*) and Poole (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

wheat is grown rather widely in about 14 States. About 170,000 acres were grown in 1919, distributed as shown on the accompanying map (Fig. 20.) The leading States in the production of Russian Red are Indiana, Ohio, and Illinois. Owing to the confusion of the names, Russian Red and Red Russian, both of which are used for several varieties of wheat, the determination of the exact distribution of the above wheat is difficult.

The yields of Russian Red have been less than those of several other varieties in the Corn Belt. The variety could be displaced generally with profit by other wheats. Russian Red apparently is not superior to Poole in milling and baking quality.

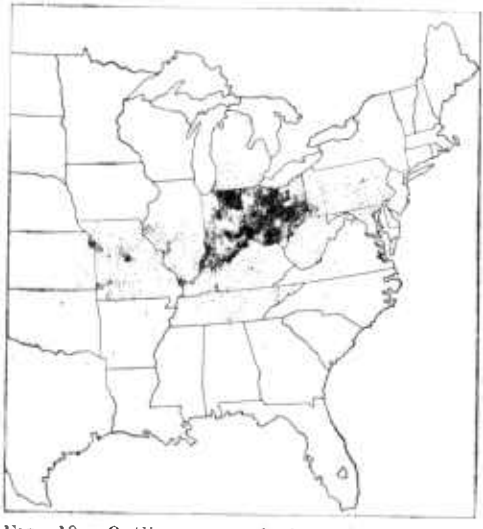

FIG. 19.—Outline map of the eastern United States, showing where Poole wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 2,453,400 acres.

RED MAY.

Red May is known also as Canadian Hybrid, Early Harvest, Early May, Early Ripe, Enterprise, Jones Longberry, May, Michigan Amber, Michigan Wonder, Orange, Pride of Indiana, Red Amber, Red Cross, Red Republic, and Republican Red. This wheat differs from Poole in being earlier and in having more erect heads, wider chaff, and wider and more angular kernels (Fig. 21, B).

FIG. 20.—Outline map of the eastern United States, showing where Russian Red wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 172,000 acres.

Red May is a very old variety of wheat. It has been recorded as being identical with the Red Lammas or Yellow Lammas wheat which was grown in Europe during the seventeenth century. Various other histories of the variety have been given, but it seems certain that Red May wheat has been grown in the United States for nearly 100 years.

Red May wheat, including the synonymous varieties, is now grown in about 25 States in the eastern half of the United States. It is

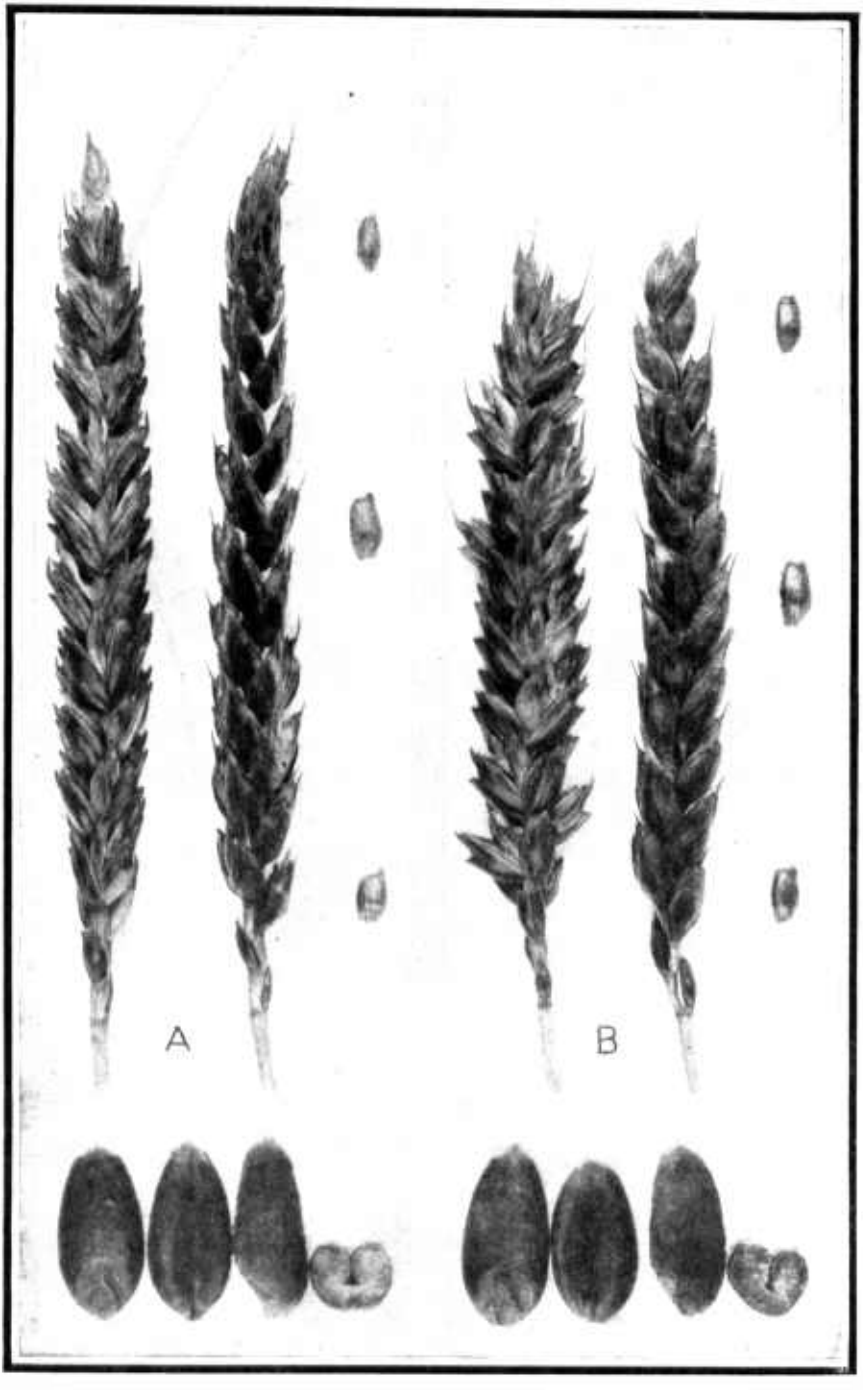

FIG. 21.—Heads, chaff, and kernels of China (*A*) and Red May (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

most important in Missouri, Kansas, Indiana, Illinois, and Arkansas. About 1,165,000 acres of Red May wheat were grown in the United States in 1919, distributed as shown on the accompanying map (Fig. 22). It is fifth in importance among the soft red winter wheats. As the name Red May is badly confused with other varietal names, especially Flint, the exact determination of the distribution of the variety is difficult.

Red May is one of the best varieties in the southern Cotton Belt, but usually is outyielded by Purplestraw and Fulcaster. Under such names as Michigan Wonder and Early Ripe, the Red May is a productive variety in parts of Indiana and Missouri. In Missouri, however, the Fulcaster variety gives higher yields. Although a good wheat for general growing over a large area, Red May could be displaced by higher yielding varieties in most of the sections where it is grown now.

In milling and baking quality Red May is fair, being somewhat inferior to Fultz and similar wheats.

FIG. 22.—Outline map of the eastern United States, showing where Red May wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 1,165,900 acres.

ILLINI CHIEF.

Illini Chief (Early Carlyle and Finley) differs from Red May in being taller and later. The heads of the two varieties are practically identical, although Illini Chief contains mixtures of other forms. Illini Chief has shown considerable resistance to Hessian fly injury. The origin of Illini Chief is not known, but it formerly was grown in Ohio as Early Carlyle and later in Illinois as Finley. It was named and distributed as Illini Chief in 1915 by E. L. Gillham, of Edwardsville, Ill., who called attention to its resistance to Hessian fly.

The variety is now grown to a limited extent in Illinois, Kansas, Missouri, and Ohio. Limited tests of Illini Chief have not shown it to be a high-yielding variety except when Hessian fly injury is severe on other varieties. This wheat should be grown only in order to avoid this injury, as in general other varieties give higher yields. In milling and baking quality Illini Chief probably does not differ from Red May.

RED CLAWSON (EARLY RED CLAWSON).

Red Clawson (Zellar's Valley) differs from Red May in being later and in having slightly longer and more clubbed heads and longer kernels (Fig. 23, A). This variety was originated in 1888 as the result of a cross between Clawson (a white common wheat) and Golden Cross made by A. N. Jones, of Newark, N. Y. It was distributed first by Peter Henderson & Co., seedsmen, of New York City. Red Clawson is now grown in 15 States. It is most important

FIG. 25.—Heads, chaff, and kernels of Red Clawson (*A*) and Rochester (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

in Michigan and Ohio. About 80,000 acres of Red Clawson were grown in the United States in 1919, distributed as is shown on the accompanying map (Fig. 24).

Red Clawson is not one of the higher yielding varieties in any section of the United States. It should be displaced by more productive wheats. It is of rather poor milling and baking quality.

FIG. 24.—Outline map of the northeastern United States, showing where Red Clawson wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 80,900 acres.

ROCHESTER (ROCHESTER RED).

Rochester (Pride of the Valley and Shepherd's Tennessee Fultz) has erect, compact, very clubbed heads (Fig. 23, B) which easily distinguish it from Red May and Red Clawson. Nothing is known concerning the origin of the variety, but the seed was offered for sale as early as 1891 by a seed company in New York. Rochester wheat is now grown sparingly in New Jersey and New York.

Rochester is not among the highest yielding varieties in any of the sections where it has been grown. Apparently it should be displaced by more productive varieties. Nothing is known concerning its milling and baking qualities.

CHINA.

China (Bluestem, Lebanon Valley, Mortgage Lifter, and Pennsylvania Bluestem) (Fig. 21, A) is taller and later and has weaker straw and more slender and tapering heads than Red May. The kernels of China are tapering and slightly curved.

FIG. 25.—Outline map of a portion of the eastern United States, showing where China wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 63,900 acres.

Several stories concerning the introduction of China have been recorded, but the most authentic history indicates that the wheat was brought from China about 1845 by Hon. Caleb Cushing, United States Minister to China. The wheat was grown and distributed by a Mr. Caverns and has since become rather extensively grown. It is found now in at least eight States and is of most importance in Pennsylvania and Maryland. About 64,000 acres of China were grown in 1919, distributed as shown on the accompanying map (Fig. 25).

China is one of the highest yielding varieties in eastern Maryland and southeastern Pennsylvania. It is outyielded slightly by various strains of Fulcaster, a bearded wheat, and is little, if any, better than Currell. In Pennsylvania, Dawson, a white wheat, has outyielded China, but it is of lower commercial value than China.

In milling and baking value China is good, being nearly equal to most of the other soft red winter wheats previously discussed.

WHEEDLING.

Wheedling differs from China chiefly in being shorter and in having more erect heads. It was originated about 1890 from heads selected from a field of wheat in Indiana by Louis Wheedling. The wheat was increased, until it now is grown in several counties in northern Indiana. About 11,000 acres were grown in 1919.

Wheedling is not a leading variety in the sections where it is grown. Apparently it could be displaced by more productive varieties, such as Poole, Red May, Fultz, or Red Rock. Nothing is known concerning the milling and baking quality of Wheedling.

CURRELL (CURRELL'S PROLIFIC).

Currell is known also as Gill, Golden Chaff, Pearl Prolific, Red Odessa, Red Prolific, and Tennessee Prolific. It differs from the other wheats which have brown chaff and purple straw so far discussed in this section in having quite slender heads (Fig. 18, A). It is earlier and shorter than China. The straw usually is purple, but sometimes the color fails to develop.

This variety originated from three heads found in a field of Fultz, in Virginia, by W. E. Currell in 1881. It was first sold for seed in 1884. About 645,000 acres were grown in at least 18 States in 1919, as shown on the accompanying map (Fig. 26). It is most important in Missouri, Kansas, Maryland, Oklahoma, and Kentucky.

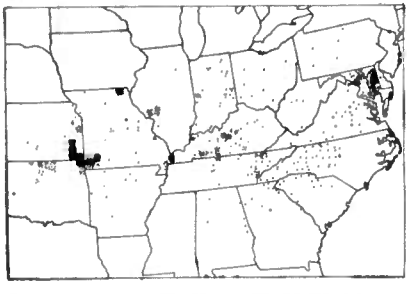

FIG. 26.—Outline map of the east-central United States, showing where Currell wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 645,000 acres.

Currell is among the best varieties in Maryland, Pennsylvania, New Jersey, and Virginia. It also is a productive variety in western Kentucky and in southeastern Kansas and the adjoining section of southwestern Missouri.

In the sections just mentioned Currell could further displace some of the less productive varieties. The bearded variety, Fulcaster, is somewhat more productive than Currell in Maryland, Pennsylvania, and Virginia.

Currell, although good, is apparently slightly inferior to China in milling and baking quality.

RED WAVE.

Red Wave is known also as Advance, Indiana Red Wave, Jones Red Wave, Old Dutch, Red Chaff, Red Ivory, Red Wafer, Ruble, Rust Proof, Waif, Waverly, and Worlds Fair. It differs from the varieties previously discussed in having white or yellow instead of purple straw. The heads are long, wide, and quite nodding (Fig. 27, A). The chaff is of a light-brown color. Red Wave and Poole appear very similar in the field except that Poole has purple straw and slightly darker chaff.

Red Wave was originated by A. N. Jones, of Le Roy, N. Y., in 1906, by crossing Red Clawson with an unnamed crossbred wheat.

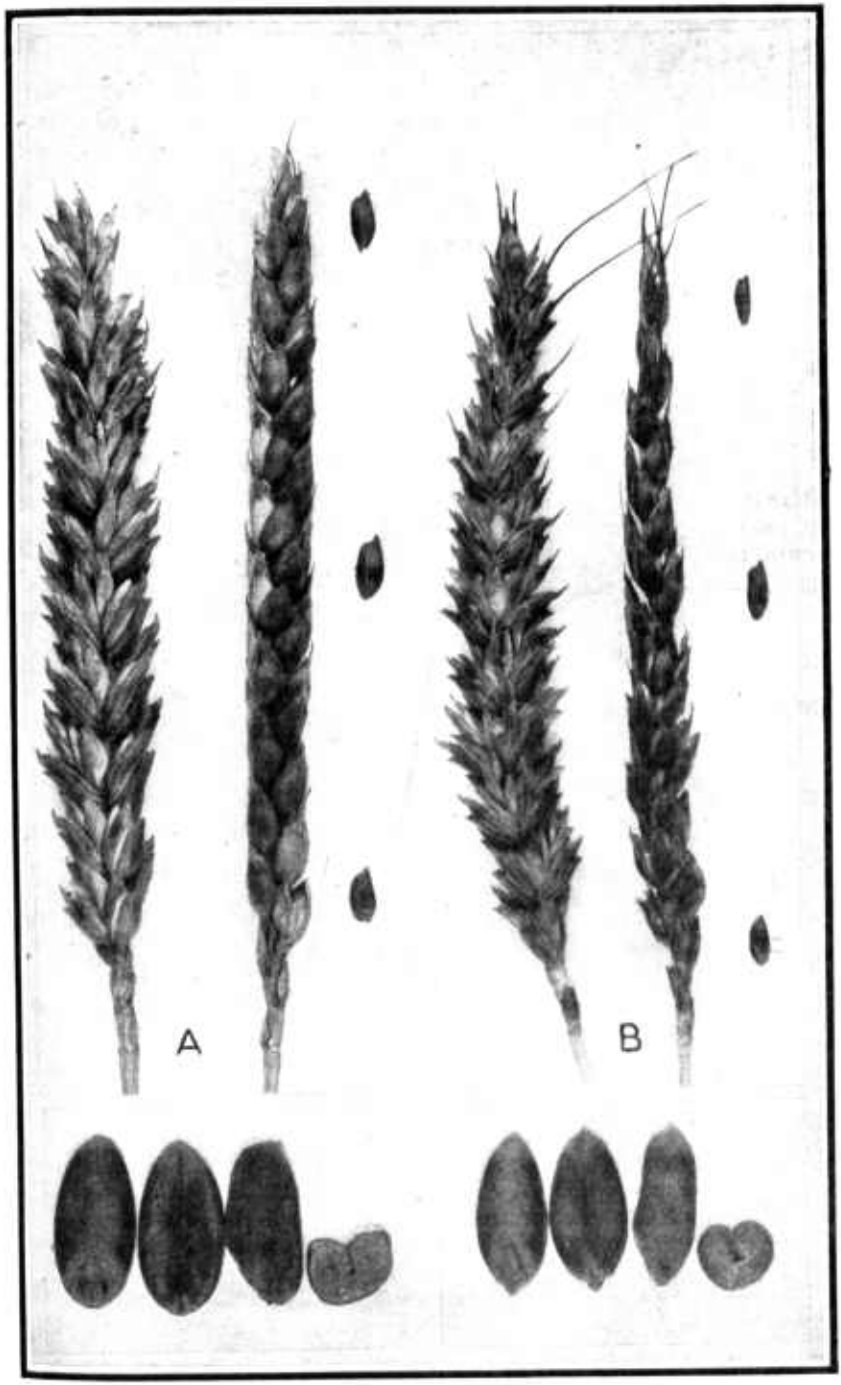

FIG. 27.—Heads, chaff, and kernels of Red Wave (*A*) and Odessa (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

It rapidly became popular, until it is now sixth in importance among the soft red winter wheats. About 1,132,000 acres of Red Wave wheat were grown in the United States in 1919. It is found in 22 States but is most important in Indiana, Ohio, Illinois, Pennsylvania, and Missouri. The distribution of Red Wave is shown on the accompanying map (Fig. 28).

Red Wave is among the more productive wheats in parts of Indiana, Missouri, Ohio, Pennsylvania, and Illinois, but is the best variety in only a few localities. In general, other varieties, such as Fulcaster and Poole, have given higher yields than Red Wave, so that in many sections more productive varieties should displace it.

Red Wave is considerably inferior in milling and baking quality to such varieties of soft red winter wheat as Fultz, Poole, and Fulcaster.

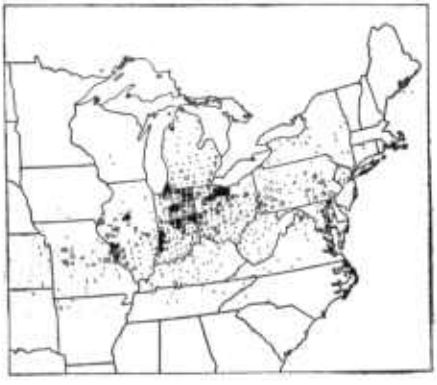

FIG. 28.—Outline map of a portion of the United States, showing where Red Wave wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 1,132,400 acres.

FLEMING.

Fleming (Russian Club and Winter Club) differs from Red Wave only in being slightly later and in having a somewhat narrower and less nodding head. This wheat was obtained from Russia by a Mr. Fleming, of Forsyth, Mont., who named it Russian Club and distributed the wheat in his vicinity. A limited acreage of the variety is now grown in Rosebud County, Mont. Fleming apparently is less hardy and productive than Turkey, a hard red winter wheat, and should be displaced by that variety. It can not compete with the hard red spring and hard red winter wheats in central and eastern Montana, but nothing is known concerning its behavior in other States. The milling and baking quality of Fleming has not been determined.

PETERSON (LARS PETERSON).

Peterson differs from Red Wave in being slightly taller and in having longer heads. The origin of the variety is not known, but it has been grown in Navajo County, Ariz., for several years. It is found now only in that county and is decreasing in importance there. Although Peterson has been fairly productive on the dry lands in the locality in which it is grown, it is now being and should be displaced there by more productive wheats of other classes.

HOMER.

Homer differs from Red Wave in having a less nodding head. The origin of this wheat is not known, although it has been grown in Chatham County, N. C., for 10 years or more. Apparently it is grown only in that county. Nothing is known concerning its productivity or milling and baking quality.

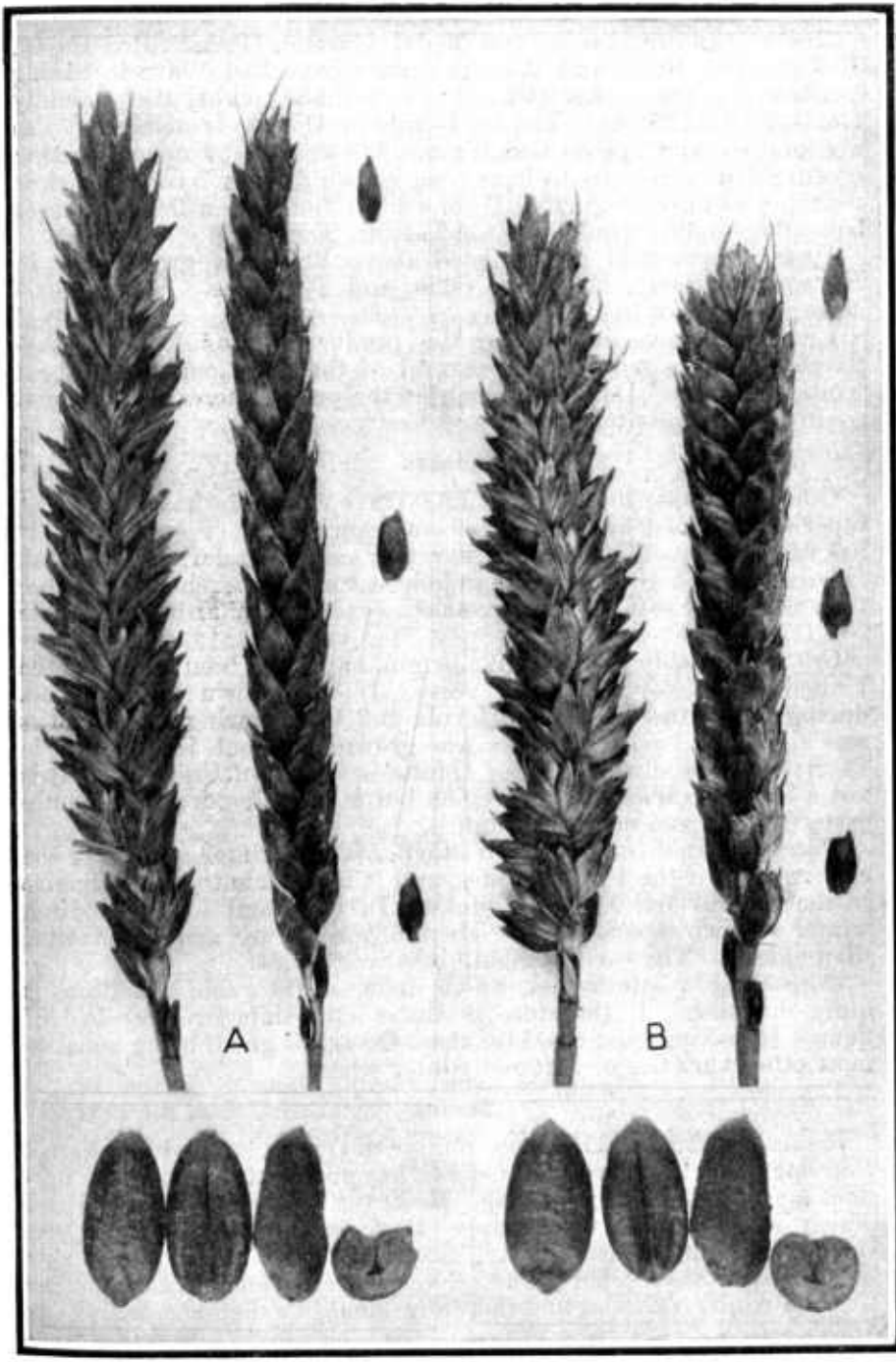

FIG. 29.—Heads, chaff, and kernels of Rupert (*A*) and Rural New Yorker No. 6 (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section, magnified 3 diameters.

RUPERT (RUPERT'S GIANT).

Rupert (known also as Gold Medal, Hartzel, Haskell, Red Hassel, Red Haskell, Ruck, and Woods) differs from Red Wave in having heads which are thicker at the tip, sometimes making them slightly clubbed (Fig. 29, A). The tip beards on the heads of Rupert also are longer than those on Red Wave. The origin of Rupert is rather obscure, but it appears to have been known first as Woods, which is reported to have originated from a head found in a field of wheat belonging to William Woods, of Talbott, Tenn.

Under the several names listed above Rupert is grown now in Kansas, Kentucky, Michigan, Ohio, and Tennessee. About 14,000 acres were grown in 1919.

Little is known concerning the productivity of Rupert. Apparently it does not outyield several of the more popular soft red winter varieties. Doubtless much of the present acreage of Rupert could be sown profitably to other wheats.

ODESSA.

Odessa (Grass) differs from Red Wave chiefly in having slender, tapering, inclined heads and in being much later (Fig. 27, B). It has white straw. The kernels are rather small, slender, and rounded. Odessa also is a very winter-hardy wheat and apparently is hardier than any of the soft red winter varieties except Minhardi and Buffum No. 17.

Odessa probably is of Russian origin, but it has been grown in the United States for nearly 60 years. It was grown in Minnesota during the sixties and in California and Utah during the seventies and eighties. In 1919 Odessa was grown on about 54,000 acres in 13 States. The distribution of Odessa is shown in Figure 30. It is not a leading variety in any region but is most important in southeastern Idaho and northern Utah.

Odessa can not compete with other soft red winter wheats in the eastern half of the United States, and it is too late to be productive in the Central and Northern States. In Utah and Idaho hard red winter and white common varieties in general are more productive than Odessa. The variety should be discontinued.

Odessa has a soft kernel, which under unfavorable conditions is quite shrunken. It therefore produces a medium or low yield of flour. In baking quality of the flour Odessa is good, being equal to most other varieties of soft red winter wheat.

RESACA.

Resaca (Red Resaca) is very similar to Odessa in head and kernel characters. It is earlier than Odessa, has purple straw, and will produce a crop from spring sowing. Resaca is thus a true spring wheat which is grown from fall sowing. Its origin is not known. It was introduced into Burnet County, Tex., over 30 years ago and is now grown there to a limited extent. Even there it yields less than other soft red winter varieties and therefore should be discontinued.

GOLD DROP.

Gold Drop (known also as Littleton) differs from Red Wave and other wheats in this section in being very early and in having short

tapering heads. This wheat apparently is the old Golden Drop variety originated in England in 1834. It has been grown in this country for 80 years, but at present is found only in Arkansas, Missouri, Pennsylvania, and Tennessee. Only a few hundred acres are grown. The variety apparently is less productive than those commonly grown in the States named.

RURAL NEW YORKER NO. 6.

Rural New Yorker No. 6 (known also as Burtaker, No. 6, Red Hussar, and Twentieth Century) differs from Red Wave in having nearly erect, compact, clubbed heads (Fig. 29, B). The straw is white and thick. This variety is reported to have originated from a hybrid between Martin (Martin Amber or Armstrong), a white common wheat, and a plant of rye. The cross was made in 1883 by Elbert S. Carman, editor of the Rural New Yorker. The wheat was first offered for sale in 1894. It is grown rather sparingly in Michigan, New York, and Ohio. The names applied to it are confused

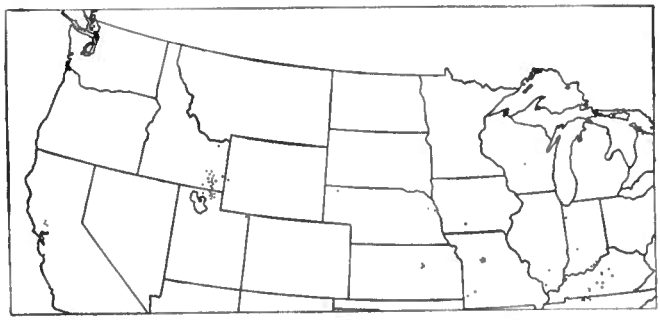

FIG. 30.—Outline map of the northwestern United States, showing where Odessa wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 54,200 acres.

with those of several other wheats, so an accurate determination of the distribution of this variety is not possible.

Rural New Yorker No. 6 is not a high-yielding variety in the sections where it has been tested and should be displaced by more productive varieties.

SQUAREHEADS MASTER.

Squareheads Master (known also as Australian Club, Brown Squarehead, and Redchaff Red Russian) is later than Rural New Yorker No. 6 and has softer kernels. It has erect, compact, clubbed heads and white, stout, strong straw. Squareheads Master is nearly identical with the Red Russian variety discussed in section 1 except in having brown chaff.

Squareheads Master is an English wheat originated by selection from a variety known as Scholey's Squarehead. It is not known to have been distributed in this country. This wheat (or one almost identical with it) occurs as a common mixture in Red Russian grown in California, Idaho, and Washington. Occasionally it has been separated and grown alone. A small acreage of the variety is grown now in Washington.

FIG. 31.—Heads, chaff, and kernels of Mealy (*A*) and Jones Fife (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

This wheat has the same adaptation as Red Russian and should be grown only in the humid sections of western Washington. As the kernels of the two varieties are identical, they probably are of equally poor milling and baking quality.

Section 3.—HEADS BEARDLESS; CHAFF PUBESCENT (VELVETY), WHITE OR YELLOW.

This section includes three commercial varieties differing from those previously described in having velvety or hairy chaff.

JONES FIFE (JONES WINTER FIFE).

Jones Fife (known also as Burbank's Super, Canadian Hybrid, Crail Fife, Fife, Fishhead, Silver King, Super, Velvet Chaff, and Winter Fife) is distinct in having long, wide, nodding, velvety heads (Fig. 31, B). The heads are oblong rather than tapering. The plants are of medium height and maturity and have white straw.

FIG. 32.—Outline map of the northern United States, showing where Jones Fife wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 476,100 acres.

The kernels are midsized, usually of semihard texture and of angular appearance.

Jones Fife was originated by A. N. Jones, of Newark, N. Y., from crosses made about 1889 between Fultz, Mediterranean, and a wheat known as Russian Velvet. Since that time this wheat has become rather widely grown. In 1917 it was distributed by Luther Burbank, of Santa Rosa, Calif., under the name Super, or Burbank's Super, with the claim that it was a new high-yielding wheat. Jones Fife is grown now both in the eastern and western parts of the United States under humid, irrigated, and semiarid conditions. It is most important in Washington, Illinois, Missouri, Indiana, and Idaho. About 476,000 acres of Jones Fife wheat were grown in the United States in 1919, distributed as shown on the accompanying map (Fig. 32).

Although widely adapted and a fairly productive variety Jones Fife is outyielde by one or more varieties in all sections where it is grown. In Washington and Idaho it is outyielded by hard red winter wheat and varieties of club wheat. In Illinois, Indiana, and Missouri such varieties as Fulcaster, Poole, Fultz, and Mediterranean have given higher yields than Jones Fife.

In milling and baking quality Jones Fife is among the poorer soft red winter wheats, the flour from it producing a poor loaf of bread.

MEALY.

Mealy (White Velvet Chaff, Velvet Chaff, and Velvet Head) differs from Jones Fife in having more erect and tapering heads and shorter and harder kernels (Fig. 31, A). The kernels have a long brush (tuft of hairs at the tip). Mealy originated from three heads of wheat found growing in a field of Fultz by M. A. Mealy in 1880. In 1885 and for several years thereafter Mealy was distributed by the United States Department of Agriculture.

Mealy is now grown in about 11 Eastern and Southern States. About 65,000 acres of Mealy were grown in 1919, distributed as shown on the accompanying map (Fig. 33). It is most important in Ohio, Pennsylvania, and Tennessee.

In general, Mealy has yielded less than several wheats where it is grown. Apparently it gives its best yields in eastern Ohio and western Pennsylvania and a section of northern Tennessee. In these sections, however, it yields less than several of the best varieties, by which it could be displaced profitably. Mealy is of poor milling and baking quality, being very similar to Jones Fife in the quality of bread produced.

FIG. 33.—Outline map of a portion of the eastern United States, showing where Mealy wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 65,500 acres.

TRIPLET.

Triplet is earlier, shorter, and has more erect and tapering heads than Jones Fife. The kernels are rounded and somewhat resemble those of the hard red winter wheats. Triplet was originated at the Washington Agricultural Experiment Station by crosses involving Jones Fife, Little Club, and Turkey. It was distributed first in 1918 and is grown now to some extent in Washington and Oregon.

Triplet has given good yields in the Palouse section of eastern Washington and in the Columbia Basin of Oregon. Although perhaps not the best variety of wheat for those sections, it probably will increase during the next few years because of its comparatively large yields. It is preferable to Jones Fife in eastern Washington.

Triplet is of rather poor milling and baking quality as compared with the better soft red winter wheats, but is much superior to Jones Fife and Red Russian, the soft red winter wheats with which it must compete.

Section 4.—HEADS BEARDLESS; CHAFF PUBESCENT (VELVETY), BROWN OR RED.

This section consists of one commercial variety, Grandprize, which differs from the wheats in section 3 in having brown instead of white chaff.

GRANDPRIZE (ST. LOUIS GRAND PRIZE).

Grandprize (known also as Bull Moose, Golden Chaff, New Genesee, and Velvet Head) has short, compact, inclined, clubbed heads. The heads are not of uniform shape, however (Fig. 34, A). The

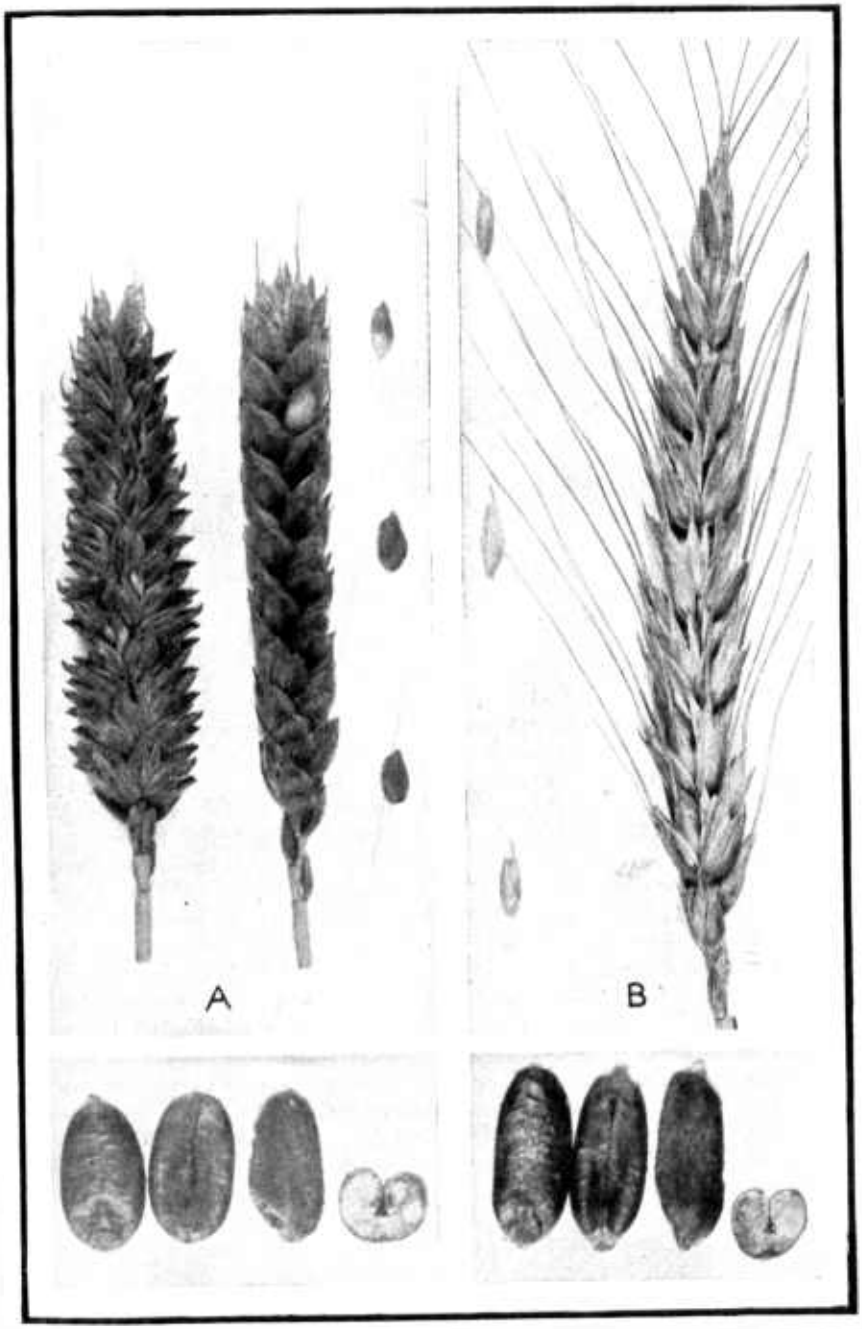

FIG. 34.—Heads, chaff, and kernels of Grandprize (*A*) and Silversheaf (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

plants are short, rather late, and have white straw. The kernels are of medium length but are wide and have a deep crease and a large brush. They are soft to semihard in texture.

Grandprize was originated by A. N. Jones, of Le Roy, N. Y., between the years 1900 and 1908. It was distributed in 1910 by Peter Henderson & Co., seedsmen, of New York City. Grandprize is grown now in at least eight Eastern States and is most important in Pennsylvania. Only about 34,000 acres of this variety were grown in the United States in 1919, distributed as shown in Figure 35.

FIG. 35.—Outline map of a portion of the eastern United States, showing where Grandprize wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 34,100 acres.

Grandprize is a rather late variety, not as productive as several of the more widely grown wheats, and should be displaced.

Section 5.—HEADS BEARDED; CHAFF GLABROUS (NOT VELVETY), WHITE OR YELLOW.

This section consists of 11 commercially grown varieties of wheat having bearded heads. The varieties differ principally in straw color and in the size of the kernels.

FULCASTER.

Fulcaster is known also under the following names: Acme, Acme Bred, Bearded Bluestem, Bearded Purplestraw, Blankenship, Blue Ridge, Bluestem, Canadian, Champion, Corn, Cumberland Valley, Dietz, Dietz Longberry, Dietz Longberry Red, Ebersole, Eversole, Egyptian Amber, Farmers Friend, Georgia Red, Golden Chaff, Golden King, Greening, Improved Acme, Ironclad, Kansas Mortgage Lifter, Kentucky Giant, Lancaster, Lancaster-Fulcaster, Lincoln, Martha Washington, Michigan Red Line, Moore's Prolific, Number 10, Price's Wonder, Red Wonder, Stoner (Eden, Famine, Forty-to-One, Half Bushel, Kentucky Wonder, Marvelous, Millennium, Millennial Dawn, Miracle, Multiplier, Multiplying, New Light, New Marvel or Goose, Peck, Russellite, Russell's Wonder, Stooling, Two Peck, Three Peck, Wonderful), Turkish Amber, Tuscan Island, and Winter King. Several of these names are used also for other varieties of wheat.

Fulcaster is distinguished by the orange-colored stripes on the chaff. It has rather large, bearded, tapering, inclined heads, and white (orange-striped) chaff (Fig. 36, A). The beaks (points on the outer chaff) are less than one-third of an inch in length. The plants are of medium height and maturity and the straw is purple. The kernels of Fulcaster are midlong, rather thick, and usually soft.

Fulcaster is reported to have originated in 1886 from a cross between Fultz and Lancaster (Mediterranean) made by S. M. Schindel, of Hagerstown, Md. In 1884, two years previous to the date mentioned above, the Dietz or Dietz Longberry, which is identical with Fulcaster, was obtained from George A. Dietz, of Chambersburg, Pa., by the Ohio Agricultural Experiment Station. The true origin of Fulcaster, therefore, is rather doubtful, but it probably is an older variety than these histories indicate. Fulcaster has been

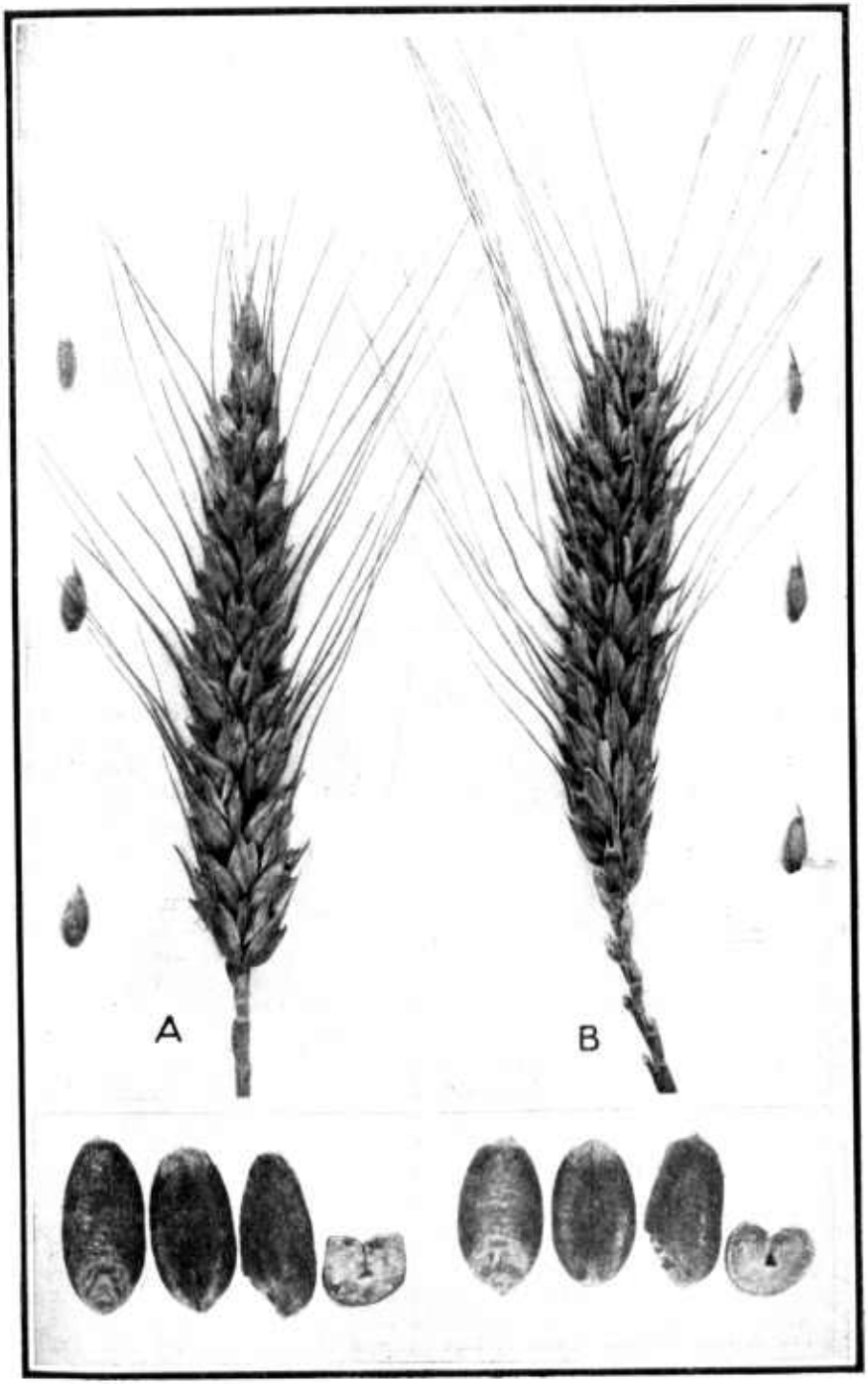

FIG. 36.—Heads, chaff, and kernels of Fulcaster (*A*) and Golden Cross (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

exploited on several occasions by firms who made extravagant claims concerning the productivity or tillering of the variety. Names such as Miracle, One-Peck-to-the-Acre, and Millennium were applied thus to a strain of Fulcaster. In spite of the claims of its heavy tillering, Fulcaster and strains of this type should be sown at the same rate as other varieties.

Fulcaster, under the numerous names listed above, is now grown in at least 26 States in the eastern half of the United States. The belt of heaviest production extends in a southwesterly direction from New Jersey to western Oklahoma. Fulcaster is grown most widely in Virginia, Pennsylvania, Oklahoma, Tennessee, Missouri, North Carolina, and Maryland. In 1919 about 2,576,000 acres of Fulcaster were grown in the United States, distributed as shown on the accompanying map (Fig. 37). It is second in importance among the soft red winter wheats and ranks fourth among all wheat varieties.

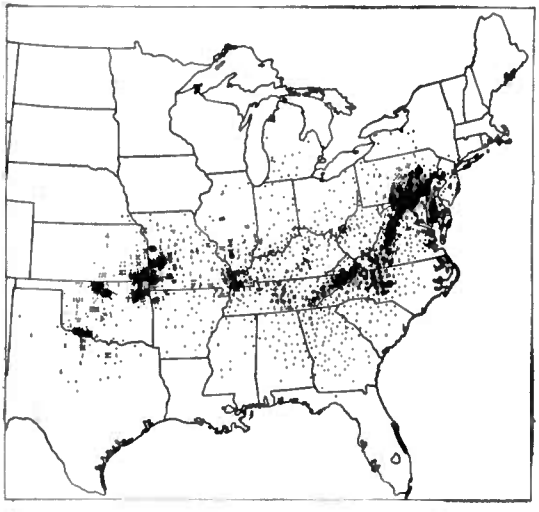

FIG. 37.—Outline map of the eastern United States, showing where Fulcaster wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 2,576,500 acres.

Fulcaster is perhaps the highest yielding variety of wheat in most parts of eastern Kansas, Missouri, southern Illinois, Tennessee, western Virginia, and Maryland. It is one of the best varieties in Oklahoma, Arkansas, North Carolina, Georgia, South Carolina, Pennsylvania, Delaware, and New Jersey. In general, it is well adapted to the Eastern and Southern States. It does not have as stiff straw as some other varieties and frequently is objected to on account of its being bearded. Fulcaster could displace with profit many of the varieties now grown in the sections where it is known to be very productive.

In milling and baking quality Fulcaster ranks with the better varieties of soft red winter wheat and is practically equal to Fultz and Poole. Under favorable but dry conditions in Kansas, Texas, and Oklahoma the kernels of Fulcaster become rather hard, and it then is nearly equal in quality to hard red winter varieties.

MAMMOTH RED.

Mammoth Red differs from Fulcaster in having a slightly larger and harder kernel and generally slightly longer beaks. The origin of this wheat is not known, but it was distributed by the David Hardie Seed Co., of Dallas, Tex., during the early nineties. It now is grown in Indiana, Maryland, Michigan, Missouri, and Virginia.

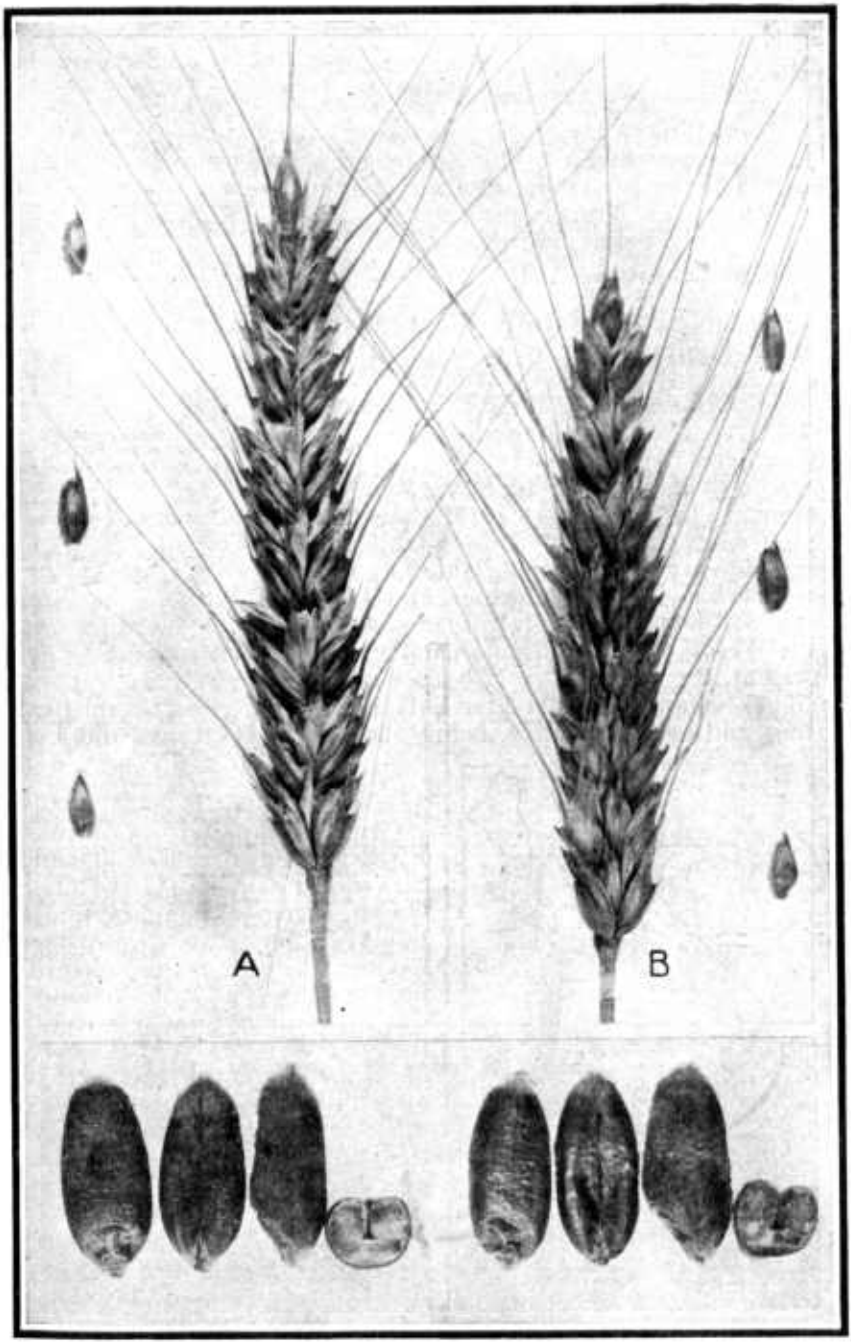

FIG. 38.—Heads, chaff, and kernels of Rudy (*A*) and Nigger (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

Mammoth Red has yielded as well as or better than Fulcaster in Maryland, and is fully equal to Fulcaster in milling and baking quality.

NIGGER.

Nigger (Winter Green, Winter John, and Winter King) differs from Fulcaster chiefly in having longer kernels and being slightly taller. The beaks (short beards on the outer chaff) of Nigger are shorter than those on Fulcaster, being only about one-sixteenth of an inch in length (Fig. 38, B).

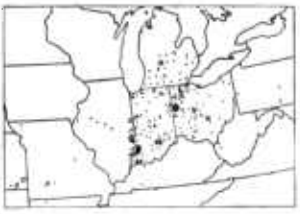

FIG. 39.—Outline map of the central United States, showing where Nigger wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 280,000 acres.

Nigger is reported to have originated from a plant found by a colored man named Sampson on his farm in Darke County, Ohio. It is of most importance in Ohio, Indiana, and Michigan. About 280,000 acres of this variety, distributed as shown on the accompanying map (Fig. 39), were grown in 11 States in 1919.

Nigger has given fair yields in Ohio, but in recent years has been outyielded by new wheats such as Gladden, Portage, and Trumbull. In Indiana, Nigger has yielded less than several other varieties. It is a promising variety in West Virginia, although not grown extensively in the State at present.

Nigger is among the better soft red winter wheat varieties in milling and baking quality, being about equal to Fultz and Poole.

FIG. 40.—Outline map of the northeastern United States, showing where Gipsy wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 122,500 acres.

GIPSY.

Gipsy (known also as Defiance, Egyptian, Farmers Friend, Golden Straw, Grains o' Gold, Gipsy Queen, Lebanon, Niagara, and Reliable) differs from Fulcaster in having white or yellow instead of purple straw, and in not having the distinct orange-colored stripes on the chaff (Fig. 41, A). The origin of Gipsy is not known. It was grown in Missouri as early as 1877. A tradition has been reported that the wheat was obtained from a gipsy. About 122,000 acres of Gipsy were grown in 1919, distributed in about 13 States, as shown on the accompanying map (Fig. 40), but it is important only in Ohio.

Gipsy has given good yields in West Virginia and Delaware. In Ohio it is outyielded by several other varieties of wheat. Except in certain localities it probably should be displaced by other varieties, and even in these localities Gladden, a selection of Gipsy, should probably be substituted for it. Gipsy is of only fair milling and

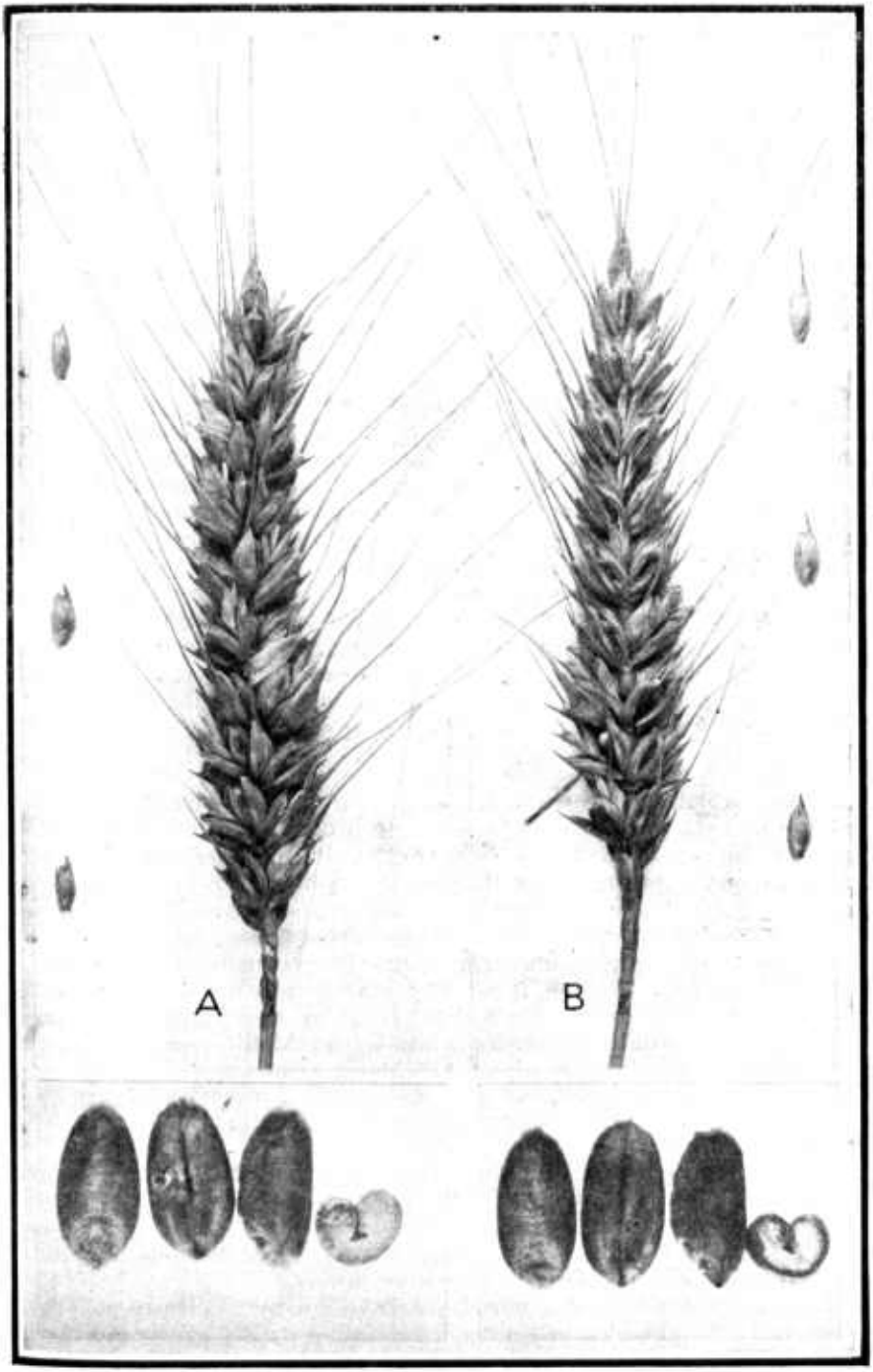

FIG. 41.—Heads, chaff, and kernels of Gipsy (*A*) and Valley (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

baking quality and is exceeded by many of the soft red winter wheats.

GLADDEN.

Gladden is very similar to Gipsy but differs in having shorter beaks, which usually are less than one-eighth of an inch long. It also has stronger straw than Gipsy. Gladden originated from a head selected from Gipsy at the Ohio Agricultural Experiment Station in 1905 and is now grown in many parts of Ohio.

Gladden has outyielded all other wheats in many places in Ohio. The growing of this variety in that State should be increased largely. In milling and baking quality Gladden is superior to Gipsy and nearly equal to any soft red winter wheat grown in Ohio.

VALLEY.

Valley (German Amber, Indiana Swamp, Niagara, Russian Amber, and Rustproof) differs from Gipsy in being slightly taller and earlier and in having longer heads (Fig. 41, B). Valley is reported to have originated in the Scioto Valley of Ohio, but the variety of wheat from which it came is not known. It is grown sparingly in Illinois, Indiana, Kansas, Ohio, and Texas.

Valley has given good yields in Ohio and Delaware. It has not been one of the highest yielding varieties in any section and could be displaced in Ohio by Gladden and in the other States where it is grown by other more productive varieties. Valley is nearly equal to Gladden in milling and baking quality but is inferior to Fultz.

SIBLEY.

Sibley, or Sibley's New Golden, differs from Gipsy chiefly in being later in maturity. Other wheats having brown chaff or purple straw are sometimes called Sibley's New Golden, but the one here discussed is known most generally by this name. Sibley is reported to have originated from a cross between Mediterranean and Clawson. It was distributed by the United States Department of Agriculture during the late eighties and was formerly grown to a considerable extent in the Ohio Valley, but is not found there now. It is grown now very sparingly in Oklahoma. It gives fair yields in eastern Oklahoma, but usually lower than those of the Mediterranean variety. It probably should be displaced by Mediterranean.

RUDY.

Rudy (known also as Anti-Rust, Black Mediterranean, Early Rudy, Kentucky Giant, and Queen of New York) is distinct in having black stripes along the margins of the chaff. The heads are long, open, tapering, and rather nodding (Fig. 38, A). The kernels are quite long and soft. The straw is white or yellow.

Rudy originated from a wheat plant found by M. Rudy at Troy, Ohio, in 1871. The variety since has become widely grown and now is found in at least 15 States, but is of importance only in Indiana,

Ohio, and Pennsylvania. About 400,000 acres of Rudy, distributed as shown on the accompanying map (Fig. 42), were grown in 1919.

Rudy is one of the most productive varieties in Indiana and southern Illinois, but is not especially promising in other sections. It is of good milling and baking quality, being equal to most of the soft red winter wheats.

FIG. 42.—Outline map of a portion of the eastern United States, showing where Rudy wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 399,400 acres.

SILVERSHEAF (JONES SILVER SHEAF LONGBERRY RED).

Silversheaf (Australian, Clipperd's Bearded, Coffee, and Davis) differs from Rudy in having dark coffee-colored stripes on the chaff instead of black stripes on the chaff margins (Fig. 34, B). The beaks of Silversheaf also are longer than those of Rudy. The straw usually is white or yellow, but mixtures of purple-strawed plants are found also. The kernels are pale red, long, and soft, and are easily shattered from the heads.

Silversheaf was originated by A. N. Jones, of Le Roy, N. Y., in 1903 by crossing Prosperity (American Bronze) and an unnamed hybrid. The wheat was distributed first by Peter Henderson & Co., seedsmen, of New York City. It is grown in Maryland, New York, North Carolina, and West Virginia. About 35,000 acres of Silversheaf were grown in 1919, distributed as shown in Figure 43.

FIG. 43.—Outline map of a portion of the eastern United States, showing where Silversheaf wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 34,900 acres.

In the sections of Maryland, Pennsylvania, and West Virginia where most of the Silversheaf is grown, Fulcaster has given higher yields. The latter variety probably should displace Silversheaf.

GOLDEN CROSS.

Golden Cross differs from other varieties discussed in this section in having club-shaped heads (Fig. 36, B). The straw is purple and rather short and stout. The kernels are midlong, wide, and soft to semihard. This wheat was originated by A. N. Jones at Newark, N. Y., in 1886, apparently as a result of a cross between Mediterranean and Clawson. It was distributed first in 1888.

Golden Cross is grown on a small scale in Kentucky, Michigan, Ohio, and Oregon. It has not given high yields, however, and should be displaced by more productive varieties.

NEBRASKA NO. 28.

Nebraska No. 28 (or Nebraska Hybrid No. 28) is much earlier than any of the other wheats in this section. The plants are short and extremely early. The straw is white or yellow. The kernels

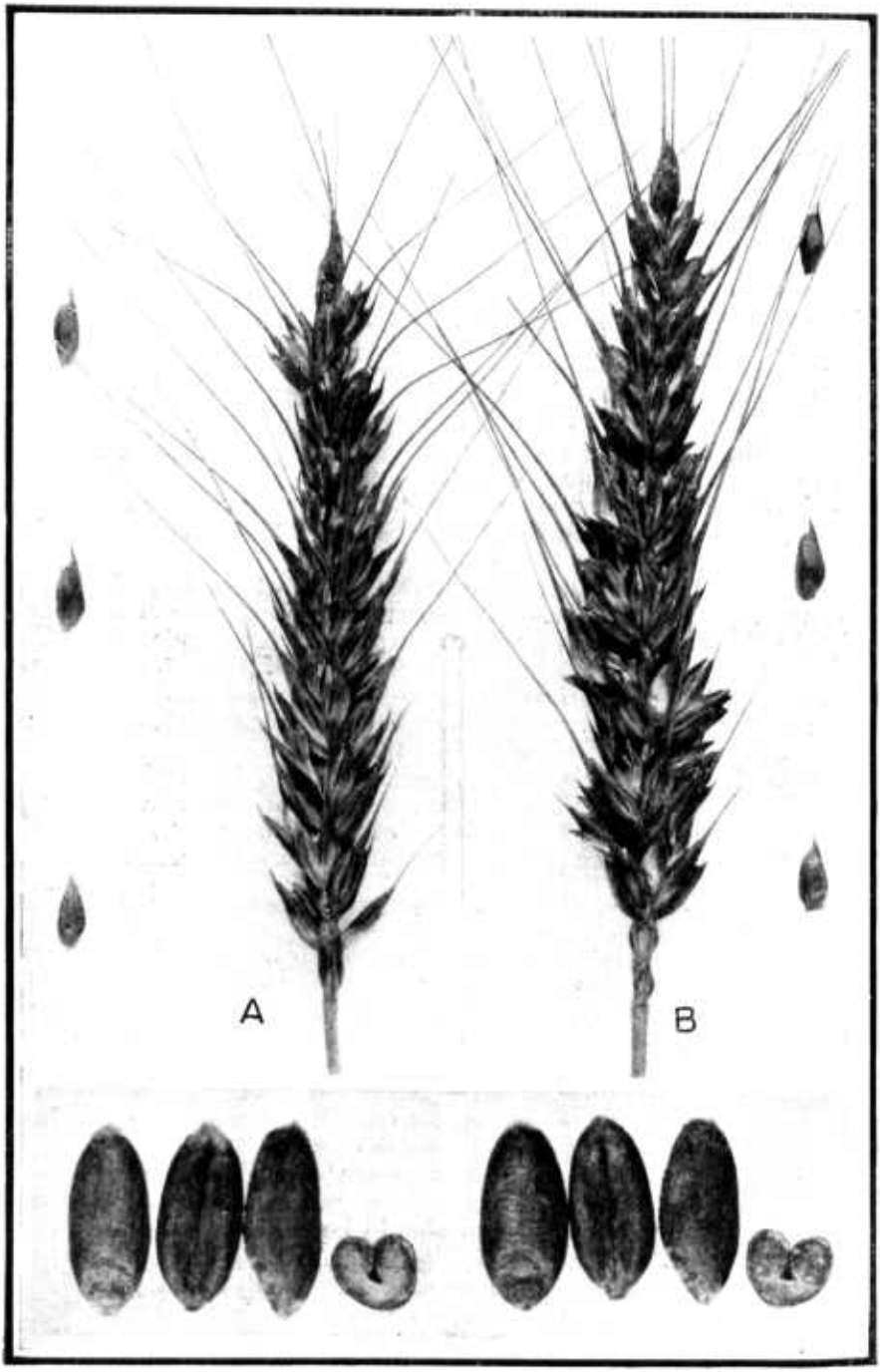

FIG. 44.—Heads, chaff, and kernels of Mediterranean (*A*) and Red Rock (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

are rather small, soft to semihard, and are easily shattered from the heads.

This wheat is the result of a cross between Big Frame and Turkey (a hard red winter wheat) made at the Nebraska Agricultural Experiment Station in 1902. Off-type plants often are found in it. It was distributed in Nebraska in 1916 and probably is grown there to some extent now. Because of its earliness it will give high yields in some seasons in various sections of the country. On the average it can not compete with the hard red winter wheats in the Great Plains area nor with the most productive varieties in other regions.

Nebraska No. 28 is of fair milling and baking quality, being poorer than many of the soft red winter wheats.

Section 6.—HEADS BEARDED; CHAFF GLABROUS (NOT VELVETY), BROWN OR RED.

The wheats in this section differ from those in the previous section in having brown or red instead of white or yellow chaff. There are five varieties which are grown commercially.

MEDITERRANEAN.

Mediterranean is known also as Acme, Bluestem, Farmers Trust, Great Western, Key's Prolific, Lancaster Red, Lehigh, Miller, Miller's Pride, Missouri Bluestem, Mortgage Lifter, Redchaff, Red Sea, Red Top, Rocky Mountain, Standby, and Swamp. This wheat has long, tapering, bearded, brown-chaffed heads and very long, soft red kernels (Fig. 44, A). The plants are tall, midseason in maturity, and have purple straw.

FIG. 45.—Outline map of the eastern United States, showing where Mediterranean wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 2,558,900 acres.

The most authentic history of the Mediterranean variety indicates that it was introduced from Genoa, Italy, in 1819, by John Gordon, of Wilmington, Del. During the next 30 or 40 years it rapidly became more popular and spread into the western wheat-growing regions. Mediterranean is grown now in about 27 Eastern and Southern States, but is of most importance in Texas, Missouri, Oklahoma, Illinois, and Pennsylvania. In 1919 about 2,560,000 acres of Mediterranean, distributed as shown on the accompanying map (Fig. 45), were grown in the United States. Texas alone having more

than 1,330,000 acres. It is the third most important variety of soft red winter wheat in this country.

Mediterranean is the highest yielding variety of wheat in the humid sections of Texas and Oklahoma. It has given very good yields in southeastern Kansas under the name Red Sea, and also in portions of Missouri. Mediterranean is a fairly productive variety in Delaware and Pennsylvania. In the remaining Eastern and Southern States other varieties have outyielded it. Mediterranean wheat is of good milling and baking quality but not quite equal to Fultz and Poole.

RED ROCK.

Red Rock is very similar to Mediterranean but has larger and more open heads and thicker and harder kernels (Fig. 44, B). Red Rock was originated from a head found as a mixture in Plymouth Rock, a white common wheat, at the Michigan Agricultural Experiment Station about 1908. It was distributed first in Michigan in 1914 and soon became widely grown in that State. It is also grown in Connecticut, Illinois, Indiana, and Ohio. Red Rock wheat is found in its greatest abundance in the southern half of Michigan. The distribution of this variety is shown on the map in Figure 46.

FIG. 46.—Outline map of a portion of the northern United States, showing where Red Rock wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 216,000 acres.

Red Rock has outyielded all other varieties of wheat in the southern half of Michigan and has given good yields in the extreme northern counties in Indiana and Ohio. It is not sufficiently winter hardy for growing in northern Michigan or in the central hard red winter-wheat region. In the States south of Michigan other varieties usually have outyielded Red Rock.

In milling and baking quality Red Rock is perhaps the best of the soft red winter wheats. Flour from this wheat produces an excellent loaf of bread.

DIEHL-MEDITERRANEAN.

Diehl-Mediterranean is known also as Auburn, Big Four, Big Ten, Blue Ridge, Eclipse, Hybrid Mediterranean, Michigan Bronze, Michigan Brown, Miller's Choice, Rattle Jack, Russian Amber, Shepherd's Perfection, Shepherd's Prolific, and Spade. This variety differs from Mediterranean principally in having a smaller kernel and white or yellow instead of purple straw (Fig. 47, A). Diehl-Mediterranean is reported to have originated from a cross between Mediterranean and Diehl (a beardless white wheat). It was distributed first in 1884 by Peter Henderson & Co., seedsmen, of New York City. During several succeeding years it was distributed also by the United States Department of Agriculture.

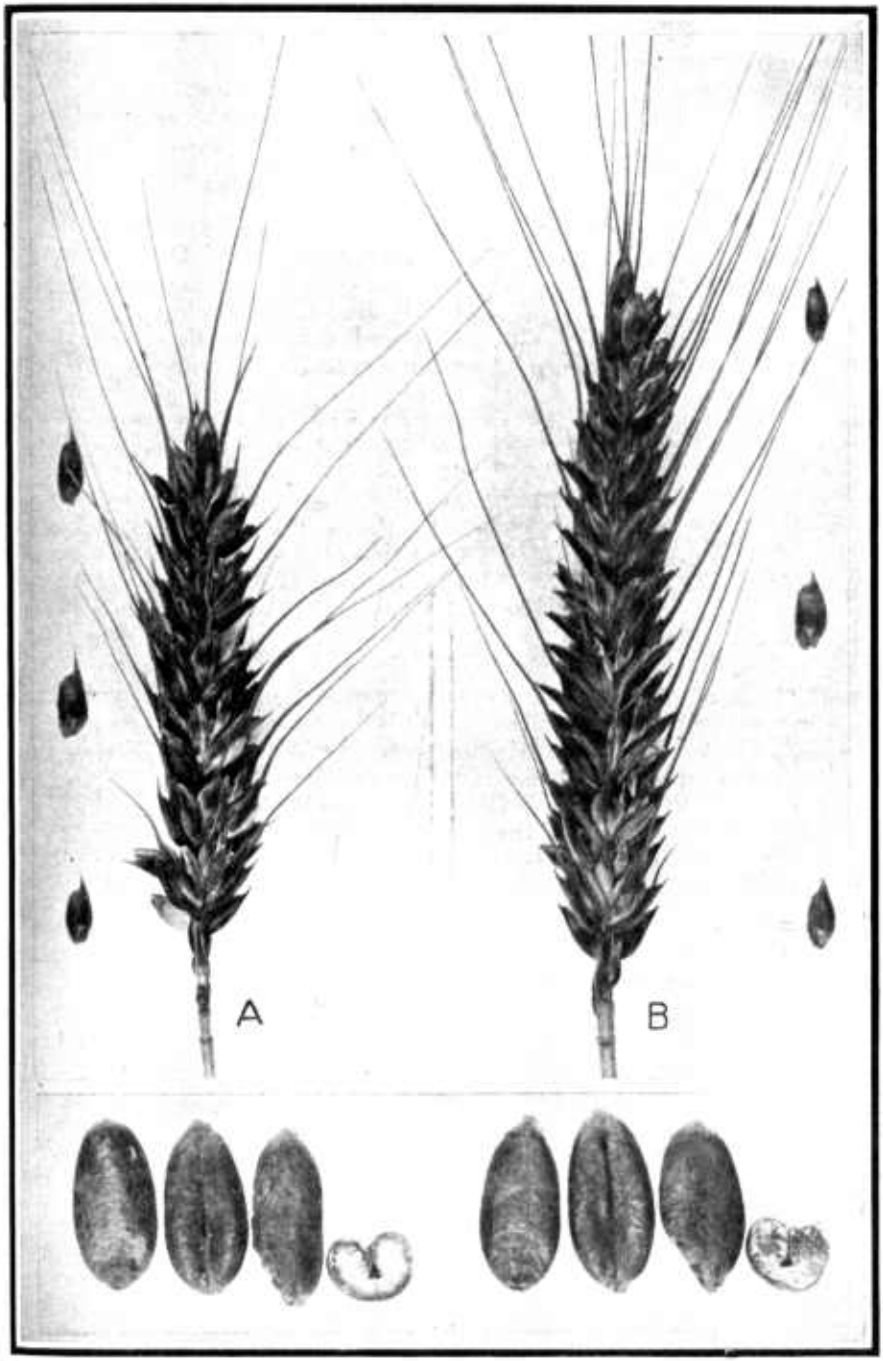

FIG. 47.—Heads, chaff, and kernels of Diehl-Mediterranean (*A*) and Goens (*B*) wheats. Heads and chaff natural size, kernels in three positions and in cross section magnified 3 diameters.

Diehl-Mediterranean wheat was grown in 1919 in about 17 Eastern and Southern States, distributed as shown in Figure 48. It is an important variety only in a few localities. Although it gives fair yields in parts of Delaware, Virginia, and southeastern Kansas it should be displaced by Fulcaster or some other more productive variety.

FIG. 48.—Outline map of a portion of the United States, showing where Diehl-Mediterranean wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 114,700 acres.

GOENS.

Goens is known also as Baldwin, Cummings, Dunlap, Dunlop, Going, Hall, Miller's Pride, Owen, Red Chaff, Red Chaff Bearded, Red Hall, and Shelby Red Chaff. Goens differs from Diehl-Mediterranean chiefly in being earlier and in having purple straw. The heads are rather small and easily shattered at maturity (Fig. 47, B). The variety is very susceptible to loose smut.

Goens is reported to have originated from a cross between Mediterranean and Gipsy, made by a Mr. Goens (or Goings) in Ohio more than 15 years ago. It is grown mostly in Indiana and Ohio, but also in Illinois, Michigan, and Pennsylvania. About 132,000 acres were grown in 1919, distributed as shown on the accompanying map (Fig. 49).

Goens wheat has given good yields in southeastern Indiana and western Ohio, where most of it is grown, but outside of these sections it can not compete with other more productive varieties. Within these sections it probably yields but little better than several more widely grown varieties. It is of good milling and baking quality, being about equal to Fultz.

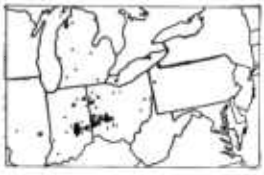

FIG. 49.—Outline map of a portion of the eastern United States, showing where Goens wheat was grown in 1919. Each dot represents 1,000 acres or fraction thereof per county. Estimated area, 132,600 acres.

COX.

Cox (or Cox Red Crown) is later than Goens and has an oblong or club-shaped head. The kernels are wide and soft. The origin of Cox is not known, but it has been grown in the Columbia Basin of Oregon for nearly 25 years. It has never been an important variety there and now is found only in small quantities. Cox wheat has not given large comparative yields in any section in which it has been grown.

Section 7.—HEADS BEARDED; CHAFF PUBESCENT (VELVETY), WHITE OR YELLOW.

Only one soft red winter wheat having the above characters is grown commercially in the United States.

PRIDE OF GENESEE.

Pride of Genesee has bearded heads, velvety white or yellow chaff, and rather wide, soft to semihard red kernels. It is very similar to

a variety known as Rural New Yorker No. 57, which was formerly grown in New York.

Pride of Genesee was originated by A. N. Jones, at Newark, N. Y., in 1893, but the parentage of the wheat is not known. It is grown sparingly in northwestern New York and has given fair yields, but can not compete with several old standard and new improved varieties of soft red winter and white wheat grown in the same section.

Section 8.—HEADS BEARDED; CHAFF PUBESCENT (VELVETY), BROWN OR RED.

The single commercial wheat of this section differs from that of the preceding section in having brown or red chaff.

PENQUITE (PENQUITE'S VELVET CHAFF).

Penquite has bearded, tapering, nodding, brown-chaffed heads and midsized soft red kernels. The plants are midtall and midseason in maturity and have purple straw. This variety originated from three heads found in a field of wheat in Clinton County, Ohio, by Abram Penquite about 1857. The wheat was increased and distributed and formerly was grown considerably in southwestern Ohio. It is grown now in several Eastern and Southern States, often being confused with other wheats called Velvet Chaff.

Penquite has not yielded as well as several other varieties of soft red winter wheat and the growing of this variety should be discontinued. It is not equal to Fultz, but is of good milling and baking quality.

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This bulletin is a contribution from the—

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